EPA REGION V ARCS PROGRAM
EPA Contract No. 68-W8-0093
Work Assignment No. 17-5L4J
SEC Donohue Project No. 20026

13

VOLUME 3
DRAFT REMEDIAL INVESTIGATION REPORT
APPENDIX B - TECHNICAL MEMORANDA (PHASE II) AND
APPENDIX C - TECHNICAL EVALUATION MEMORANDA

HIMCO DUMP
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
ELKHART, INDIANA
August
~~MAY~~ **1992**

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

APPENDIX B

TECHNICAL MEMORANDA (Phase II Field Work)

TM 18 **Landfill Cap Sampling**
TM 19 **Soil Boring, Monitoring Well Installation, and Well Development**
TM 20 **Groundwater Sampling**
TM 21 **Private Well Inventory**
TM 22 **Surficial Soil Sampling**
TM 23 **Surface Water/Sediment Sampling**
TM 24 **Test Pit Excavation and Leachate Collection**
TM 25 **Wetlands Delineation**
TM 26 **Slug Testing and Analysis**
TM 27 **Summary of Phase I and Phase II Sampling Activities**
TM 28 **Water Level Measurements**
TM 29 **Geotechnical Data Presentation**

ORIGINAL

TECHNICAL MEMORANDUM - NO. 18

DATE: November 1, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Steve Padovani

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI/FS Phase II

LANDFILL CAP SAMPLING

Introduction

Five soil samples (GE-07 through GE-11) were collected on September 11, 1991, from the landfill cap at Himco Dump, Elkhart, Indiana, for geotechnical analysis. Sampling methods described in the Field Sampling Plan Addendum I, Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991 were followed. Geotechnical samples were taken to evaluate the potential for slope failure of a new landfill cap constructed over the existing cap. The geotechnical analysis consisted of determining shear strength by the triaxial shear method.

Soil Sampling Procedures

Soil samples were collected with a stainless steel hand auger. Sample material was transferred directly from the hand auger to one quart mason jars (one jar per location) using a stainless steel spoon.

Two samples were collected from the calcium sulfate matrix (GE-07 and GE-08) and three samples were collected from the landfill cover sandy materials (GE-09, GE-10, and GE-11). The calcium sulfate samples were collected at a depth interval of 3 to 18 inches. The first three inches were primarily sand. In addition, at GE-08 a strong hydrogen sulfide smell was detected. At the sandy landfill cover locations GE-10 and GE-11, calcium sulfate was encountered below six inches. Therefore, three grab sand samples were composited from 0 to 6 inches at each location in order to produce an adequate sample volume. At sample location GE-09, calcium sulfate was encountered below 12 inches. At this location two grab sand samples were collected from 0 to 12 inches and composited in order to produce an adequate sample volume. All auger holes at each sample location were within twenty feet of one another. More detailed descriptions of soils collected are contained on the Soils Data Forms included in Appendix A.

Decontamination

The hand auger and spoon were decontaminated before sampling and between sampling locations with:

1. Soap and distilled water wash
2. Two distilled water rinses

SP:ds

A/R/HIMCO/AF7

APPENDIX A

SOILS DATA FORMS

SHEET 1 OF 95

Donohue | Soils Data Form | Soil Sample Area Landfill cap

Soil Subsample GE-08 $CaSO_4$ ~~Hill GEO 05E~~ ?

Engineers & Architects & Scientists | Site Himco | Project No. 20023

DATE 9/11/91

TIME 1600

COLLECTOR S. Padovani
T. Koach

SAMPLE DEPTH 0-18"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Sparse vegetation in sand and gravel. some $CaSO_4$ at surface

DESCRIPTION OF SUBSAMPLE: $CaSO_4$ - off white fluffy damp powder

0-6" trace sand ≈ 1%

collected next to marker

ANY OTHER CHARACTERISTICS OF NOTE:

6-12" - strong H_2S smell

12-18" - moderate H_2S smell

SHEET 2 OF 5

Donohue | Soils Data Form | Soil Sample Area Landfill cap

Soil Subsample GE-07 $CaSO_4$ (~~tank GEO-01~~)?

Engineers & Architects & Scientists | Site Himco | Project No. 20023

DATE 9/11/91

TIME 1215

COLLECTOR S. Padovani
T. Koach

SAMPLE DEPTH 0-18"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Field - vegetative ? ? with sand & gravel cover, dry, next to old test pit - some $CaSO_4$ present at surface

DESCRIPTION OF SUBSAMPLE: First 3" sand, ~~Sample collected for $CaSO_4$~~. $CaSO_4$ collected from 3-6", 10' south of GE-07 marker. $CaSO_4$ collected from 6-18" 10 feet north of GE-07 marker

this says two samples are 20 feet apart!!

$CaSO_4$ off white fluffy powder - damp, sticks together, compressable

ANY OTHER CHARACTERISTICS OF NOTE:

SHEET 3 OF 5

Donohue | Soils Data Form | Soil Sample Area Landfill cap

Soil Subsample GE-09 Sand ~~Lark (GEO-05)~~ ?

Engineers & Architects & Scientists | Site Hyco | Project No. 20023

DATE 9/11/91

TIME 1430

COLLECTOR S. Padovani
M. Ghiasi, P.E.

SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: ~~Sparsely~~ vegatatre, mostly sand and gravel - dry

DESCRIPTION OF SUBSAMPLE: Light brown poorly graded medium grained sand (USCS-SP) with trace Casby, Damp

Collected ~~from~~ within 2 feet of marker. Moved ≈ 1 foot to west and collected more material for sample @ (0-12") ?

ANY OTHER CHARACTERISTICS OF NOTE:

SHEET 4 OF 85

Donohue | Soils Data Form | Soil Sample Area Landfill cap

Soil Subsample GE-10 Sand ~~(Hart Geo 4) E~~ ?

Engineers & Architects & Scientists | Site Himco | Project No. 20023

DATE 9/11/91

TIME 1500

COLLECTOR S. Padovani
M. Ghiasi, P.E.

SAMPLE DEPTH 3 holes 0-6" ~~composited~~
located within one foot of each other
and ≈ 25' north of K-12
coordinates

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Vegetative, Sand w/ some $CaSO_4$ on surface, dry

DESCRIPTION OF SUBSAMPLE: Light yellowish brown medium grained sand intermixed with trace (≈5-10%) $CaSO_4$. Damp

ANY OTHER CHARACTERISTICS OF NOTE: Below 6" $CaSO_4$ was found with only ~~trace~~ ≈20% sand - could not sample for sand below 6"

SHEET 45 OF 45

Donohue | Soils Data Form | Soil Sample Area Landfill cap

Soil Subsample ~~GE-11~~ NO LATH Marker

Engineers & Architects & Scientists | Site Himco | Project No. 20023

DATE 9/11/91

TIME 1520

COLLECTOR S. Padovani
M. Ghiasi, P.E.

SAMPLE DEPTH 0-6" - 3 holes ≈ 6" from each other

Location: 5' south of K-18 marker

This location was selected due to ~~lack~~ inaccessability of originally planned GE-11 location. Actual location approximately 250' south of orginally planned GE-11 location.

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Vegatative with Sand and gravel - Dry

DESCRIPTION OF SUBSAMPLE: Dark brown with shades of very dark brown fine to medium grained silty sand with trace amounts of gravel - Damp

ANY OTHER CHARACTERISTICS OF NOTE:

ORIGINAL

TECHNICAL MEMORANDUM - NO. 19

DATE: November 4, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Steve Padovani

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

SOIL BORING, MONITORING WELL INSTALLATION AND WELL DEVELOPMENT

Introduction

One chemical/geotechnical soil boring and one groundwater monitoring well (WT111A) were installed on September 10, 1991, at the Himco Dump site located in Elkhart, Indiana. The groundwater monitoring well was developed on September 11, 1991. The purpose of this memorandum is to summarize the drilling, sampling, well installation, and well development procedures.

Chemical/Geotechnical Soil Boring

One soil boring was drilled in conjunction with the installation of a groundwater monitoring well to further define the stratigraphy of the site and for chemical and geotechnical analysis of soils.

The soil boring was drilled to 17 feet with a Central Mine Equipment (CME 55) truck mounted drill rig using 4 1/4-inch ID hollow stem augers. Soil samples were collected with a standard 3-inch inside diameter split spoon sampler from the following depth intervals: 0 to 2 feet, 5 to 7 feet, 10 to 12 feet, and 15 to 17 feet. Samples were logged and classified according to the Unified Soil Classification System (USCS) and Munsell Soil Color Chart. Samples were also described for texture, moisture content, and screened for volatile organic compounds (VOCs), percent oxygen (O_2), lower explosive limit (LEL), and hydrogen sulfide (H_2S). The soil boring log is presented in Appendix A.

In general, poorly graded medium to coarse grained sand was encountered over the entire boring depth. The water table was encountered at approximately 13 feet below ground surface. Drill cuttings were placed in metal 55-gallon drums and stored within the fenced drum storage area at the site.

Three soil samples collected by split spoon were selected for chemical and geotechnical analysis. Chemical/geotechnical sample collection depths included the following intervals: 0 to 2 feet, 5 to 7 feet, and 10 to 12 feet. Because of soil saturation below 13 feet, a sample was not collected for chemical or geotechnical analysis from the 15 to 17-foot interval. A

duplicate sample was collected from the 0 to 2-foot interval. The duplicate sample was collected by driving a split spoon from 0 to 2 feet at a location one foot southwest of the original boring. This was done because the initial split spoon did not provide enough sample volume to adequately fill a second suite of sample jars. Soil for volatile organic analysis (VOA) was transferred directly from the split spoon to two 120 ml glass jars using a stainless steel spoon. The remaining soil in the split spoon was then transferred to a stainless steel bowl using the spoon. The soil was mixed until a homogeneous mixture was obtained. The soil was then placed into three 8 oz. wide mouth glass jars and one quart sized mason jar and sent to appropriate laboratories for BNA, PCB/pesticide, metals, TOC, and grain size analysis. No difficulties were encountered during the drilling and sampling of the soil boring.

Monitoring Well Installation (WT111A)

Well WT111A was installed in order to further investigate water quality conditions near the Kolanowski shallow well. The Kolanowski shallow well exhibited high lead concentrations in the Phase I sampling program. This groundwater monitoring well was installed to intercept the water table. The monitoring well installation depth was established in the previously drilled chemical/geotechnical soil boring. The augers were advanced to 20.5 feet for construction of the water table well based on previous knowledge of the depth to the water table. The water table was then allowed to equilibrate for one hour at which time the water table was measured at 13 feet below ground surface. The 10-foot long screen was installed so that the water table would intercept the screen approximately 2 to 3 feet below the top.

The monitoring well was constructed of 2-inch (ID) Schedule 40, flush-threaded stainless steel riser and a 10-foot, 0.010-inch slotted stainless steel screen. The threaded joints between sections of pipe were wrapped with teflon tape. The annular space between the well screen and the borehole wall was backfilled with No. 50 silica sand. The filter sand pack was extended 1.1 feet above the top of the screen. A bentonite pellet seal was installed and extended 2.0 feet above the filter sand pack. The bentonite pellet seal was hydrated with 5 gallons of potable water for one hour before the installation of a bentonite cement grout. The bentonite cement slurry seal was extended to approximately one foot below ground surface and allowed to settle overnight. The next morning the slurry had settled to approximately three feet below ground surface. A cement collar was then extended to ground surface. A 4-inch diameter 5-foot long steel protective casing with locking lid extended approximately 2.0 feet above ground surface and was set into the concrete collar. A lock was installed on the lid of the protective casing. Three 4-inch diameter 5-foot long concrete filled guard posts were installed around the well. Both the protective casing and well cap were vented. The well construction diagram is included in Appendix B.

Well Development

Monitoring well (WT111A) development began 24 hours following the completion of well construction. The well was first measured for the depth to the water table and the depth to the well bottom. These measurements were taken from the top of the well riser. Well

volumes were calculated and recorded on a Well Development Form (Appendix C). Volume calculations used the following formula:

Depth to Bottom (D.T.B.) - Depth to Water (D.T.W.) x 1.44 = Gallons per Well Volume

1.44 = gallons per linear foot in a 2 inch diameter well + the saturated annular space around the well screen

Well development consisted of pumping the well using a Keck impellar pump at approximately 1.0 to 1.5 gallons per minute. Intermittent surging, for approximately a 30-minute period, was performed on the well to aid in removal of fine-grained material. The well was surged by moving the pump up and down in the screen area. This moved formation water in and out of the screened area and also aided in removing any sediment. Well development continued until more than five well volumes were removed, and the water had the following characteristics:

1. Water was relatively silt free
2. Water temperature was stabilized at $\pm 0.5^{\circ}$ C
3. pH was stabilized to ± 0.1 units
4. Conductivity was stabilized to ± 10 percent

The well development data is provided in the well development form included in Appendix C.

Equipment Decontamination

All soil boring and monitoring well installation, sampling, and drilling equipment was decontaminated by high pressure hot water/steam cleaning prior to drilling. The stainless steel split spoons for collection of chemical samples were decontaminated as follows:

1. Soap and water wash
2. Tap water rinse
3. Isopropanol rinse
4. Distilled water rinse

Decontamination of the well development equipment consisted of:

1. Soap and water wash
2. Tap water rinse
3. Isopropanol rinse
4. Distilled water rinses
5. Five gallons distilled water pumped through Keck pump

The isopropanol rinses were containerized separately and were allowed to evaporate.

SP:ds

A/R/HIMCO/AF9

APPENDIX A

SOIL BORING LOG

Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

BORING LOG

SOIL BORING NO. GT-11

SITE: Himes/[illegible] PROJECT NO. 20023

DRILLING METHOD: Hollow Stem - 3⅜"
FOREMAN: Danny Goodwin
ASSISTANT: Jim Barker
GEOL./ENG'R. S. Padovani
LOG BY: S Padovani

WATER LEVEL READINGS

DATE	TIME	DEPTH	
			W.D.
			S.C.R.
			A.C.R.
			HRS. A.D.
			HRS. A.D.

GROUND SURFACE ELEV.
PHYSICAL SETTING: flat field
DATE START: 9/10/91
DATE COMPLETE: ~~[illegible]~~ 9/10/91

DEPTH TO CHANGES IN STRATA	DEPTH IN FEET	SAMPLING DATA NO.	T	A	R	PENETRATION 1st	2nd	3rd	N	USCS	SOIL DESCRIPTION	COMMENTS
	0–2	[illegible] / [illegible]	9							SP	3/4 Dark brown poorly graded fine to ~~[illegible]~~ grained sand ~~[illegible]~~ 7.5YR 4/6 Strong brown poorly graded medium to coarse grained sand with six large piece of gravel	Vis taken [illegible] +moist
	5–7	7/10, 11/13	24							SW	5/4 (7.5YR) Reddish brown well graded medium to coarse grained sand	+moist
	10–12	6/7, 6/5	8							SP	5/4 (10YR) Yellowish Brown poorly graded medium grained sand with a ~~few~~ scattered pieces of large to medium sized gravel	+moist
WT → ▽	13											
	15–17	2/3, 3/4	7							SP	5/4 (10YR) Yellowish brown poorly graded medium grained sand with scattered medium ~~grain~~ to coarse grained gravel	+Saturated Sample not retained

APPENDIX B

WELL CONSTRUCTION DIAGRAM FOR WT111A

Form 102

Donohue

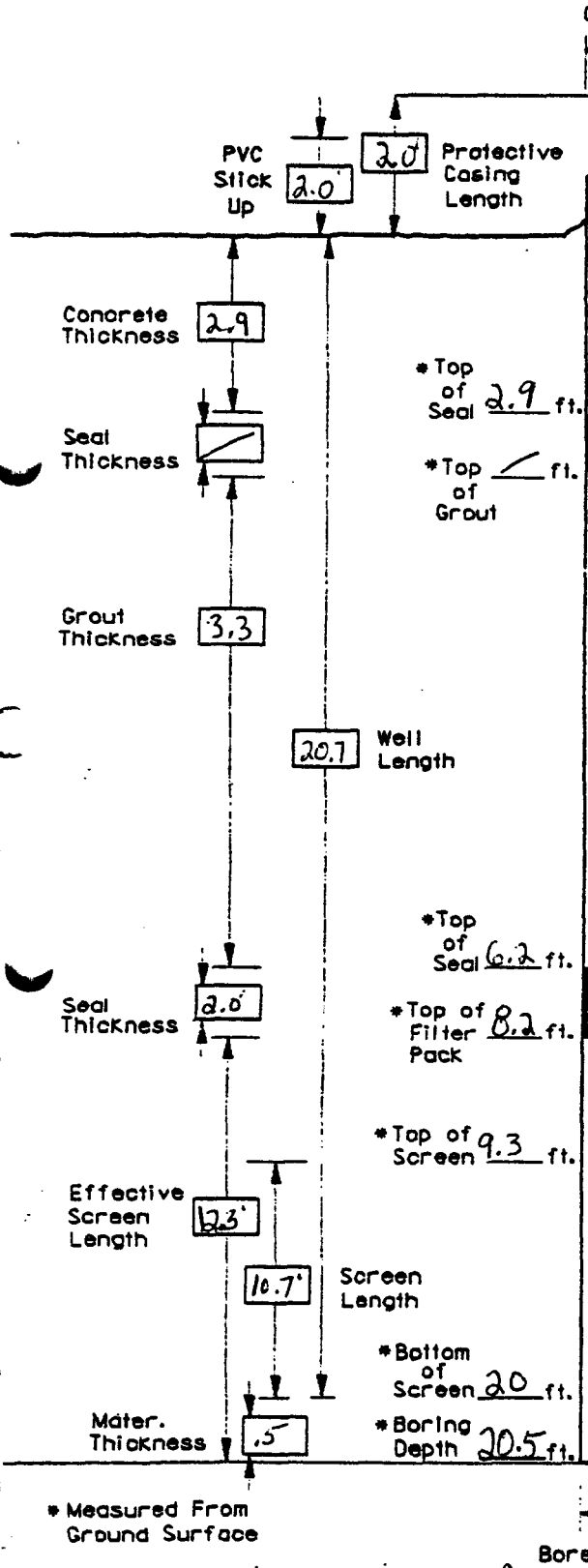
Water Table Well Installation Diagram

Site: Himco Date: 9/10/91

Inspected By: _____ Project No. 2023 Well No. WTIIIA

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

Driller/Contractor Mathes



PROTECTIVE CASING
Type Steel Vented (Yes)/No
Diameter 4" Locked Yes
Length 4' Key # 2532

GUARD POSTS
Type Steel-4"

CAP OR PLUG Vented (Yes)/No Type PVC

CONCRETE COLLAR
Cement 20 lbs. + Water 5 gal.
Total Quantity 5 gal.
Manufacturer

UPPER SEAL
Powder/Granular/Pellets Quantity gal.
Hydrated gal.. Time
Manufacturer

PIPE Type Stainless Steel Schedule 40
O.D. 2 1/8" I.D. 2"
Length/Sec. 10' No. Of Sec. 1 + 2.0' sec at top
Manufacturer

GROUT Type Bentonite cement
Mix 12 lbs. of bentonite +
lbs. of +
Water 30 gals. Total Quant. 15 gal.
Manufacturers

JOINTS Flush Threaded (Yes)/No
Teflon Taped (Yes)/No O-Ring Yes (No)
Manufacturer

LOWER SEAL
Powder/(Pellets) Quantity 5 gal.
(Hydrated) ≈ 5 gal.. Time 1430
Manufacturer

SCREEN
Type Stainless steel Schedule 40
Length/Sec. 5' No. of Sec. 2
O.D. 2 1/8" I.D. 2"
Slot Size 0.010-inch No. Slots/ft.
Manufacturer

FILTER PACK Type(s) No. 50 sand
Source colorado Volume 3.5 gal.
Manufacturer CSSI

PLUG OR CAP Type Stainless Length .50'

MATERIAL SP Poorly graded sand

WATER SOURCE Main Street with #

Notes: Protective casing vent hole near ground surface

APPENDIX C

WELL DEVELOPMENT FORM FOR WT111A

WTIII A

Sheet 1 of 1

Donohue

Engineers & Architects

Well Development

Project No. 20023 Site Htmco 9/11/91

Method of Development Pumped Y Bailed _____ Blown _____ Surge Block _____

Equipment Y Airlift _____ N2 Lift _____ In. Bailer _____ Length _____ Ft. Material _____

Pump Keck Manufacturer _____ Diameter _____

Description of site (weather, temp, soil conditions) cloudy- rainy, 70°F, sandy & vegatative (moist)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Removed (gal.)	Depth After	pH	Cond.	Color	Odor Y/N	Temp. °C	Turbidity	Comments
WTIII A 9:10	12.21'	21.60'	5		6.8	43	grey brown	N	17	Hi	HN_4 = 0ppm
9:20			10		6.6	70	brown	N	25	Hi	well opening cap
9:30			15		6.4	75	brn	N	16	Hi	Surged
9:40			20		6.2	83	brn	N	16	Hi	
9:55			25		6.2	85	brn	N	16	Hi	Surged
10:00			30	5.8	5.9	95	brn	N	16	Hi	
1008			35		5.7	106	brn	Y	16	medium	H_2S smell
1015			40		5.7	108	brn	Y	17	Hi	Surged, H_2S
1022			45		5.6	112	brn	Y	16.5	medium	
1027			50		5.7	106	Brn	Y	16	Hi	Surged, H_2S
1034			55		5.7	102	BrN	Y	16	Light	H_2S
1040			60		5.6	112	BrN	Y	16.5	Light	
1048			65		5.7	111	BrN	Y	17	medium	Surged
1058			70		5.7	108	BrN	Y	17	Light	
1105			75		5.7	104	BrN	Y	17	Light	
1110			80		5.7	104	BrN	Y	17	Light	
				11.8'							

Additional Notes: Well volume: 14.21'(DTW) - 2.0'(TOC) = 12.21

21.6'(DTB) - 12.21' = 9.39'

1 well vol = (0.162 × 9.39') + (1.28 × 9.39') = 14 g × 5 well vol = 70 gal

Entered on computer _____ Signature _____ Date 1 1

ORIGINAL

TECHNICAL MEMORANDUM - NO. 20

DATE: November 8, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Bill Schaefer

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

MONITORING WELL SAMPLING

Introduction

Nineteen monitoring wells were sampled during the Phase II Remedial Investigation (RI) at the Himco Dump between September 23-26, 1991. These wells were sampled to investigate the vertical and horizontal extent of contamination of the uppermost unconsolidated aquifer. Ten of the wells sampled were wells installed by Donohue for the EPA during the Himco Dump RI Phase I; eight of the wells sampled were wells installed in 1977 and 1979 by the United States Geological Survey (USGS); and one well sampled was an EPA well installed by Donohue during the Himco Dump RI Phase II. Monitoring wells sampled during Phase II are listed below:

EPA Wells	USGS Wells	EPA Wells (Phase II)
101A	B2	111A
101B	B3	
101C	B4	
102A	CP-1	
102B	E2	
102C	M1	
103A	M2	
104A	P	
105A		
106A		

Groundwater samples were collected by Anya Kirykowicz, Don Marusich, Bill Schaefer, and Eric Slusser, of Donohue & Associates, Inc. Groundwater samples were collected in accordance with Section 4.15.4 of the Field Sampling Plan Addendum I (FSP), Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991, with the exceptions noted in the Nonconformances section below. Completed Well Purging and Sample Collection forms are included in the Appendix.

Monitoring Well Sampling Methods

Field meters used during groundwater sampling included a YSI water quality meter which measured pH, temperature, and conductivity; a Hanna pH meter; a Cole-Parmer conductivity/temperature meter; two HNu photoionization detectors; and two lumidor four gas meters. The meters were transported to each well location in plastic coolers.

The four people sampling groundwater were divided each day into two-person teams. Upon arrival to a monitoring well, the well cap was removed and an HNu was used to monitor the air in and above the well casing top. If organic vapors were measured above background levels by the HNu, the sampling team retreated from the monitoring well and allowed the well to vent. The sampling team then periodically monitored the air in and above the well casing until organic vapor levels had decreased to the background level. Elevated organic vapor levels were measured by the HNu at wells B3 and B4. The readings were 1 ppm and 3 ppm above background, respectively.

A decontaminated water level measuring tape was then lowered into the well casing to obtain a water level and well bottom depth. This information was recorded on Well Purging and Sample Collection forms, provided in the Appendix. Based on the diameter of the well, the water level, and depth to bottom, a well volume was calculated using the equation provided in the Phase II FSP.

A variety of methods were used to purge and sample the nineteen monitoring wells: a two-inch diameter Keck pump, two-inch diameter stainless steel bailers, a one-inch diameter teflon bailer, and a four-inch diameter submersible pump manufactured by Gould. The particular method used to purge and sample each well was determined by the well diameter, volume of water to be purged, and the existence of kinks or obstructions in the well. Groundwater conductivity, pH and temperature were measured using either the YSI water quality meter connected in-line to the Keck pump, or by using the Hanna pH and Cole-Parmer conductivity/temperature meters when bailers or the Gould pump was used.

The following monitoring wells were purged and sampled using a Keck pump: 101B, 101C, 102A, 102B, 102C, 105A, 106A, 111A, and M1.

Monitoring wells B3 and B4 were purged using the four-inch diameter Gould pump and were sampled using a Keck pump. The Gould pump was used on these five-inch diameter wells due to the large volume of groundwater required to be purged. A pumping rate of approximately 30 gallons per minute (gpm) was achieved using the Gould pump, compared to approximately 1 gpm using a Keck pump.

The following monitoring wells were purged and sampled using a two-inch diameter stainless steel bailer: 101A, 103A, 104A, B2, and CP-1.

Monitoring wells E2, M2 and P were purged and sampled using a one-inch diameter teflon bailer. These three wells all had an obstruction or kink in the well casing which prevented purging and sampling using a Keck pump or a two-inch diameter bailer.

Purging of the monitoring wells continued until a minimum of five well volumes had been removed. After each well volume was purged, measurements of purge water pH, conductivity and temperature were taken and recorded on Well Purging and Sample Collection forms. If the the purge water had stabilized to pH $\pm$0.1 unit, conductivity $\pm$10%, and temperature to $\pm$0.5° C for the third, fourth, and fifth well volumes, purging was considered completed. If one or more of the parameters had not stabilized within the established range, then additional well volumes were purged until the stabilization ranges were satisfied.

Purge water was discharged directly upon the ground surface downgradient of the well being purged in accordance with the Phase II FSP.

The time between the completion of purging and the collection of the groundwater sample did not exceed 24 hours for any well. Table 4-10 of the Phase II FSP summarizes the containers and preservatives used to collect groundwater samples, and the analyses performed on groundwater samples. When a preservative was added to a sample, pH paper was used to ensure that an adequate volume of preservative was added to achieve the required pH.

Filtration of samples for dissolved metals or bromide analysis was accomplished in one of two ways. For those samples collected using a Keck pump, a 0.45 micron filter made by Lida Manufacturing was attached to the Keck pump outlet so that the filtered sample could be collected directly from the Keck pump into the appropriate containers. For those samples collected using bailers, the sample was collected in a filtration jug which was transported back to the trailer for filtration. The filter used at the trailer consisted of Fischer brand flasks, a Nalgene vacuum hand pump, and 0.45 micron filters made by Micron Separations, Inc. In all cases, samples were filtered within 30 minutes of collection.

Filled sample containers were stored in coolers with ice and transported to the field trailer where custody was relinquished to Tracey Koach, the sample custodian.

Quality Control Samples

In order to verify the quality of the groundwater sampling process, quality control (QC) samples were collected. The QC samples collected during groundwater sampling included two field duplicates, two field blanks, four trip blanks, and two matrix spike/matrix spike duplicate (MS/MSD) samples.

Field duplicate samples were collected at monitoring wells 101B and 111A.

The first field blank was collected by pouring Hinckley & Schmitt distilled water into a decontaminated two-inch diameter stainless steel bailer, and then pouring the distilled water from the bailer into sample bottles. The second field blank was collected by pumping Hinckley & Schmitt distilled water through a decontaminated Keck pump and then filling sample bottles directly from the Keck pump.

Trip blanks were made by pouring Hinckley & Schmitt distilled water into 40 ml volatile organic analysis (VOA) vials containing preservative. The trip blanks were transported to and from monitoring well locations in coolers alongside the sample bottles.

MS/MSD samples were collected by filling the required extra sample bottles at wells 111A and M1.

Decontamination

Groundwater sampling equipment (the one-inch bailer, the two-inch bailers, the outer parts of the Keck pump, and the outer parts of the Gould pump) which came into contact with groundwater were cleaned between wells by an Alconox and distilled water wash, a distilled water rinse, an isopropanol rinse, and two distilled water rinses. The inner parts of the Keck pump were cleaned by pumping distilled water through the system. The inner parts of the Gould pump were cleaned by spraying distilled water into the water intake on the pump. All distilled water used in decontamination was Hinckley & Schmitt brand. Isopropanol rinsates were collected in a 5-gallon bucket and incorporated into a 55-gallon drum labeled "Wastewater 9/91" stored in the locked drum storage area.

Nonconformances with the Field Sampling Plan

Eight monitoring wells were sampled using a bailer instead of a Keck pump as described in the FSP. Four of these wells were sampled with a bailer due to obstructions in the well casing which prevented the Keck pump from being used in these wells. As only one Keck pump was available, the other four monitoring wells were sampled with a bailer to keep all field team members busy and to finish groundwater sampling on schedule. The use of a bailer to purge and sample monitoring wells is an accepted groundwater sampling practice which does not effect the sample integrity.

A four-inch submersible pump manufactured by Gould was used to purge monitoring wells B3 and B4. The Gould pump was used on these five-inch diameter wells due to the large volume of groundwater to be purged.

The FSP specified 18 monitoring wells to be sampled during the RI Phase II. Nineteen wells were actually sampled. Figure 4-4 incorrectly identified the flush-mount well present on the northwest corner of the intersection of County Road 10 and Nappanee Street Extension as well CP-1. Well CP-1 is actually located approximately 150 feet south of the B-well nest. The well at the intersection of County Road 10 and Nappanee Street Extension is well P. Both wells P and CP-1 were sampled during Phase II.

The decontamination procedure for groundwater sampling equipment specified in the FSP included an Alconox and tap water wash, and a tap water rinse. Due to its availability, distilled water was substituted for tap water during decontamination of sampling equipment.

Groundwater Samples Split with Miles Laboratory

Groundwater samples from eight monitoring wells were split with Miles Laboratory, through Miles' consultant, Engineering Science of Oak Brook, Illinois. The eight wells where groundwater samples were split with Miles were: 102A, 102B, 102C, 105A, 106A, B2, B3 and B4. Donohue's sample bottles and Miles' sample bottles were filled with groundwater alternately.

A/R/HIMCO/AG2

APPENDIX

WELL PURGING AND SAMPLE COLLECTION FORMS

101A
9/23/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco Phase II

Method of Purging Pumped ____ Bailed X 2" S.S.

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 2" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site (weather, temp., soil, conditions) partly cloudy 60°F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
1324	12.80	18.4				not working				
1336				2.5		not working	1.246	17.5	Y	possible petroleum
1349				5.0		not working	1.287	16	Y	odor?
1354	Sample Collected					6.77				
1434	12.85	18.4								

Notes 2" well 18.4 - 12.8 = 5.6 x 0.163 = 0.9 x 5 say purge 5 gallons

* Cond. in mS No HNu readings

Collected by Marusich

No HNu readings

Signature ____ Date 10/2/91

P.M./86

101B
9/23/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped KECK Bailed

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer ____ Length ____ Ft. Material ____

Pump X Manufacturer Keck Diameter 2" Description of site (weather, temp., soil, conditions) Sunny 65°F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.☆	Temp	Turbidity Y/N	Comments
1255	12.65	101.55		3		8.04	.475	13.9	Y	black color - H_2S sm
1307				15		7.67	.579	12.8	Y	clear color
1322				30		7.26	.659	12.6	N	H_2S smell
1340				45		7.26	.660	12.5	N	↓
1355				60		7.29	.667	12.6	N	↓
1410	12.65			75		7.31	.666	12.6	N	↓

Notes ☆ Cond in millimhos/cm (2" well)

101.55 - 12.65 = 88.90 x 0.163 = 14.5 say 15 gallons per well volume

Sample collected by Slusser - Duplicate sample collected here
no HNu readings

Signature [signature] Date 10/2/91

P.M./86

101C

9/23/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer KECK Diameter 2" Description of site (weather, temp., soil, conditions) sunny 60°F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.★	Temp	Turbidity Y/N	Comments
815	12.45	163.0		5		7.54	.314	14.1	Y	lt. gray color
923				25		7.80	.305	12.6	Y	
953				50		7.43	.322	12.6	low	
1025				75		7.42	.321	12.6	low	
1100				100		7.43	.319	12.3	low	
1130	12.50	163.0		125		7.41	.319	12.3	low	↓
1135	Sample collected									

Notes ★ cond in millimhos/cm 2" well 163.0 - 12.45 = 150.55 = wc

150.55 x 0.163 = 24.54 gallons say 25 gallons

No HNu readings Sample collected by Schaefer/Slusser

Signature [signature] Date 10/2/91

P.M./86

102A
9/24/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco PHASE II

Method of Purging (Pumped X) Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer Keck Diameter 2" Description of site drizzle low 50's
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
1245	12.07	17.86		1		7.42	.800	13.8	Y	
1246				2		7.32	.798	14.2	Y	DO = 4.9 mg/L
1247				3		7.30	.794	14.4	Y	
1247				4		7.29	.791	14.5	N	
1248				5		7.26	.795	14.6	N	
1250	Sample	Collected								

Notes * Cond in millimhos/cm

2" well 17.86 - 12.07 = 5.79 = WC

5.79 x 0.163 = 0.94 say 1 gallon per well volume

No HNu readings Sampled by Schaefer/Slusser Split with Miles

Signature [signature] Date 10/2/91

P.M./86

102 B
9/24/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer KeeK Diameter 2" Description of site cloudy 50s
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ★	°C Temp	Turbidity Y/N	Comments
1346	11.74	67.90		5		7.62	.442	12.0	Y	start 1342
1350				10		7.53	.446	11.8	N	
1400				20		7.50	.446	11.7	N	
1408				30		7.49	.441	11.6	N	
1418				40		7.49	.438	11.6	N	DO 2.4 mg/L
1428				50		7.49	.448	11.6	N	

Notes 2" well 67.90 - 11.74 = 56.16 = wc

56.16 x 0.163 = 9.15 gallons say 10 gallons per well volume

No HNu readings

Sample collected by Schaefer/Slusser/split with Miles

★ cond in millimhos/cm

Signature Schaefer Date 10/2/91

P.M./86

102 C
9/24/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump KECK Manufacturer KECK Diameter 2" Description of site (weather, temp., soil, conditions) cloudy 50's °F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
0754	12.23	159.0		5		11.76	.802	11.9	Y	
818				25		11.60	1.002	11.4	Y	
842				50		8.95	.306	11.4	Y	
915				75		8.42	.258	11.4	slight	
940				100		8.15	.257	11.3	N	
1005				125		7.99	.258	11.4	N	
1030				150		7.89	.257	11.4	N	
1055				175		7.83	.257	11.4	N	
1115				200		7.79	.257	11.5	N	DO 3.6mg/L
1118	Sample collected using Keck									

Notes 2" well 159.0 - 12.23 = 146.77 = wc

146.77 x 0.163 = 23.92 say 25 gallons = 1 well volume

* cond in millimhos/cm

collected by Schrader/Slusser No HNu readings

Sample split with Miles Consultant

Signature Schrader Date 10/2/91

P.M./86

103A
9/24/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped _____ Bailed X 2" S.S. Bailer

Equipment _____ Airlift _____ N2 Lift _____ In. Bailer 2" Length 3 ft. Ft. Material _____

Pump _____ Manufacturer _____ Diameter _____ Description of site 52°F raining
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
822	7.17	18.17								
834				2		not working	.615	21	High	H_2S smell
838				4			.624	22	High	dark brown color
843				6			.624	21.9	High	
848				8			.626	21.9	High	
852				10			.626	21.9	High	
855	Collect Sample									
924	7.18	18.17				7.62				

Notes 18.17 − 7.17 = 11.0 × 0.163 = 1.79 say 2.0 gallons per well volume

No HNu readings

* cond in milli Siemens Sample collected by Anya/Slussar

Signature _____ Date 10/2/91

P.M./86

104A

9/24/91

Donohue

Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco Phase II

Method of Purging Pumped ____ Bailed X 2" S.S. bailer

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 2" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site 52°F RAINING
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
1043	13.49	18.40								
1052				1.0		not working	0.191	16.9	Y	Dark Brown Color
1055				2.0			.193	16.9	Y	
1058				3.0			.196	16.8	Y	
1100				4.0			.197	16.9	Y	
1103				5.0		↓	.197	16.9	Y	↓
1107	Collect Sample									
1137	13.48	18.38				8.17				

2" well

Notes 18.40 − 13.49 = 4.91 × 0.163 = 0.80 × 5 = 4 gallons to purge

HN_4 = background

☆ cond. in millisiemens/cm

collected by Anya/Slusser

Signature ____ Date ____

P.M./86

105A
9/25/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer KECK Diameter 2" Description of site 45°F raining
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
1014	11.55	18.25								
1024				1.5		7.78	.203	14.2	low	Cloudy
1025				3.0		7.79	.202	14.4	low	
1027				4.5		7.83	.201	14.5	low	
1029				6.0		7.84	.201	14.5	very slight	
1030				7.5		7.85	.201	14.5	" "	
1035	Sample	Collected								
1111	11.53	18.25								

Notes 2" Well 18.25 − 11.55 = 6.7 x 0.163 = 1.09 say 1.5 gallons
No HNu

☆ cond in millimhos/cm No HNu readings

collected by Slusser/Anya

Sample split with Miles Consultant

Signature _____ Date 10/2/91

P.M./86

106A
9/25/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer KECK Diameter 2" Description of site 45°F Rain
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
0805	10.65	18.23								
0813				1.5		7.59	.257	11.5	med	
0815				3.0		7.17	.570	12.4	slight	
0816				4.5		7.09	.608	12.7	N	
0817				6.0		7.06	.622	12.8	N	
0819				7.5		7.06	.628	12.8	N	
0821	Collect	Sample								
0933	10.65	18.23								DO=2.2 mg/L

Notes ☆ cond in millimhos/cm 18.23 - 10.65 = 7.58 x 0.163 = 1.23
Say 1.5 gallons / well volume

HNu = background

Sample split with miles consultant Collected by Anya / Slusser

Signature Date

P.M./86

111 A

9/25/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped X Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer KECK Diameter 2" Description of site 50°F Rainy
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
1214	14.17	21.53								Silty bottom
1222				1.5		6.72	.227	14.8	med	H_2S odor
1224				3.0		6.34	.223	14.5	slight	
1225				4.5		6.24	.233	14.5	clear	
1227				6.0		6.15	.228	14.5	slight	
1228				7.5		6.10	.224	14.5	slight	
1230				9.0		6.05	.220	14.5	slight	DO = 1.9 mg/L
1235	Collect	Sample								
1338	14.17	21.53								

Notes ☆ cond in millimhos/cm 21.53 - 14.17 = 7.36 x 0.163 = 1.19 say 1.5 gal per well volume

No HNu readings

Sample collected by Anya and Eric Slusser - Duplicate Sample collected here

Signature Date

P.M./86

KINKED WELL!

B2
9/26/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco Phase II

Method of Purging Pumped (Bailed) using 2" S.S. bailer

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 2" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site (weather, temp., soil, conditions) partly sunny mid 50s

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.	Temp	Turbidity Y/N	Comments
1255	8.26	13.55								
1416			1	1		8.78	0.62	11.1	Y	Brown color
1422			2	2		8.53	0.58	10.7	Y	" "
1425			3	3		8.47	0.59	10.7	Y	" "
1428			4	4		8.48	0.59	10.7	Y	" "
1432			5	5		8.46	0.59	10.9	Y	" "
1450	Sample collected									

Notes 13.55 − 8.26 = 5.29 = WC

5.29 × 0.163 = 0.86 gallon per well volume Say 1.0 gallon

conductivity in millisiemens/cm. This well was hand bailed

There is a kink at 10' which does not allow use of Keck pump

Signature Schaefer Date 10/2/91

P.M./86 Sampled by Schaefer/Slusser SPLIT WITH AUDIT

5" WELL

Donohue
Engineers & Architects

Well Purging and Sample Collection

B3
9/26/91

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging (Pumped) GOULDS Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer GOULDS SUBMERSIBLE Diameter 4" Description of site (weather, temp., soil, conditions) partly sunny mid 50s

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
935	9.63	126.10*		30		7.67	.422	11.2	Y	lt. yellow color
947				120		7.48	.480	11.2	N	clear color
951				240		7.42	.640	11.2	N	
955				360		7.40	.624	11.2	N	
959				480		7.39	.620	11.2	N	DO = 2.2 ppm
1004				600		7.40	.640	11.1	N	
1230	well sampled using Kock pump									

☆ cond. in millimhos/cm

Notes * may be silt on bottom 1.0 ppm above background in well when vented as measured by HNu

126.10 - 9.63 = 116.47 = WC 5" well 1.02 x 116.47 = 118.80 gallons per well volume
say 120 gallons

This is a 5" well - Goulds pump rate 30gpm

Signature Schaefer Date 10/2/91

P.M./86 Sampled by Schaefer/Slusser SPLIT WITH ALLIED

5" WELL

B4
9/26/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO

Method of Purging (Pumped) GOULDS Bailed

Equipment Airlift N2 Lift In. Bailer Length Ft. Material

Pump X Manufacturer GOULDS SUBMERSIBLE Diameter 4" Description of site (weather, temp., soil, conditions) partly sunny mid 50s

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
834	8.68	175.12								Start Purging
840				180		7.60	.165	11.4	Y	at 100 gallons
846				360		7.55	.170	11.4	N	water was sediment laden - brown c
852				540		7.54	.200	11.3	N	cleared up by 13
858				720		7.53	.225	11.3	N	9
904				900		7.50	.197	11.4	N	DO = 6.2 mg/L
910				1080		7.51	.201	11.3	N	
916				1260		7.54	.193	11.3	N	
922										
1112	Sample collected using Keck									

Notes 3 ppm above background in well casing when well vented using HNu

5" well 175.12 - 8.68 = 166.44 = wc

166.44 x 1.02 = 169.78 gallons per well volume say 180 gallons

Goulds Pump rate 30 gpm - * Cond. in millimhos/cm

Signature Schaefer Date 10/2/91

P.M./86 Sampled by Schaefer/SLUSS SPLIT WITH MILES

CP-1
9/26/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco Phase II

Method of Purging Pumped ____ Bailed X

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 2" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site (weather, temp., soil, conditions) partly sunny mid 50s

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond.*	Temp	Turbidity Y/N	Comments
0950	5.60	16.70								
0959			2.0	2.0		8.89	2.85	12.0	Y	Pink cream color
1007				4.0		8.69	1.39	11.5	Y	pink cream color
1012				6.0		8.53	1.10	11.0	Y	" " "
1018				8.0		8.46	1.06	11.0	Y	" " "
1022				10.0		8.46	0.96	10.7	Y	white/cream
1028				12.0		8.46	0.96	10.7	Y	" "
1031	Sample collected									
1151	6.43	16.71								

Notes 16.70 − 5.60 = 11.1 × 0.163 = 1.8 gallons Say 2.0 gallons

No HNu readings above background in well casing

* Cond in millisiemens/cm

Sampled by Anya and Marusich

Signature ____ Date ____

P.M./86

KINKED WELL

E2

9/25/91

Donohue

Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site HIMCO PHASE II

Method of Purging Pumped ____ Bailed X 1" teflon bailer

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 1" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site (weather, temp., soil, conditions) sunny 55°F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
759	12.55	16.20								
817				0.6		7.13	1-21	11.9	Y	Brown color due
822				1.2		7.17	0.59	11.8	Y	to sand
828				1.8		7.08	0.34	11.4	Y	
835				2.4		7.24	0.34	11.5	Y	
845				3.0		6.89	0.34	11.6	Y	
848				3.6		6.88	0.31	11.9	Y	
0852				4.2		6.86	0.35	11.8	Y	
0852	Sample Collected									
1012	Sample collection finished									

Notes 16.20 - 12.55 = 3.65 = wc 2" PVC well

3.65 x 0.163 = 0.60 gallons per well volume

☆ conductivity in mS Sampled by MARUSICH/SCHAEFER

MUST USE 1" BAILER TO SAMPLE THIS WELL

Signature [signature] Date 10/2/91

P.M./86

M1
9/26/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026 Site Himco PHASE II

Method of Purging (Pumped) KECK Bailed

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer ____ Length ____ Ft. Material ____

Pump X Manufacturer KECK Diameter 2" Description of site pt. sunny high 50s
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
1503	18.31	104.50								
1530				15		7.04	.820	11.5	N	clear
1545				30		7.02	.811	11.5	N	
1605				45		7.00	.814	11.5	N	
1620				60		7.02	.801	11.5	N	
1630				70		7.03	.802	11.5	N	
1635				75		7.02	.801	11.5	N	DO = 1.2 mg/L
1640	Sample Collected									

Notes 104.50 - 18.31 = 86.19 x 0.163 = 14 gallons per well volume
purge 14 x 5 = 70 gallons
2" well

Sampled by Kirykowicz Marusich Slusser
cond in millimhos/cm

Signature _____ Date 10/2/91

P.M./86

KINKED WELL

M2
9/25/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026.023 Site Himco PHASE II

Method of Purging Pumped ____ Bailed X teflon bailer

Equipment ____ Airlift ____ N2 Lift ____ In. Bailer 1" Length 3' Ft. Material ____

Pump ____ Manufacturer ____ Diameter ____ Description of site ____
(weather, temp., soil, conditions)

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH	Cond. ☆	Temp	Turbidity Y/N	Comments
1207	17.40	24.45								
1224				1.0		6.29	1.27	11.3	Y	black wate / H_2S sm
1229				2.0		6.27	1.28	10.9	Y	" " / " "
1235				3.0		6.42	1.28	10.5	Y	
1243				4.0		6.47	1.22	10.8	Y	
1254				5.0		6.50	1.13	10.8	Y	
1306				6.0		6.51	1.15	10.8	Y	

Notes ☆ Cond. in mS 2" well 24.45 − 17.40 = 7.05 = WC
7.05 × 0.163 = 1.15 well volume in gallons

This well is Kinked - MUST USE 1" BAILER
No HNu readings - The 1" bailer was ruined by this well. We were unable to remove black color from outside of bailer due to black water

Signature ____ Date 10/2/91

P.M./86

KINKED

Nappanee Ext. | H

PJ | Co Rd 10

P

9/23/91

Donohue
Engineers & Architects

Well Purging and Sample Collection

Project No. 20026 Site Himco Phase II

Method of Purging Pumped _____ Bailed 1" teflon

Equipment _____ Airlift _____ N2 Lift _____ In. Bailer 1" Length 3' Ft. Material _____

Pump _____ Manufacturer _____ Diameter _____ Description of site (weather, temp., soil, conditions) Sunny 50°F

Well No. / Time	Depth to Water	Depth to Bottom	Volume Calculated (gal.)	Volume Removed (gal.)	Depth After	pH *	Cond. ☆	Temp	Turbidity Y/N	Comments
0740	10.2	23.30								
851				2.25			1.265	13.7	Very	Brown
910				4.50			1.520	13.0	Very	
920				6.75			1.522	13.2	Very	
936				9.0			1.523	13.2	Very	
950				11.25			1.526	13.5	Very	
955	Sample collected									
1126	10.8	23.35				7.08				

Notes Well P is a flush mount unlocked well. It is Kinked - must use 1" bailer

23.3 - 10.2 = 13.1 x 0.163 =

☆ cond in mS

2.13 gallons per well volume

* pH meter not functional

SAMPLE COLLECTED ANYA/MARUSICH

Signature _____ Date 10/2/91

P.M./86

TECHNICAL MEMORANDUM NO. 21

DATE: November 22, 1991

TO: Vanessa Harris

FROM: Bill Schaefer

SUBJECT: EPA Region V ARCS Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project 20026
Himco Dump RI/FS

Private Well Inventory
Himco Dump Superfund Site
Elkhart, Indiana

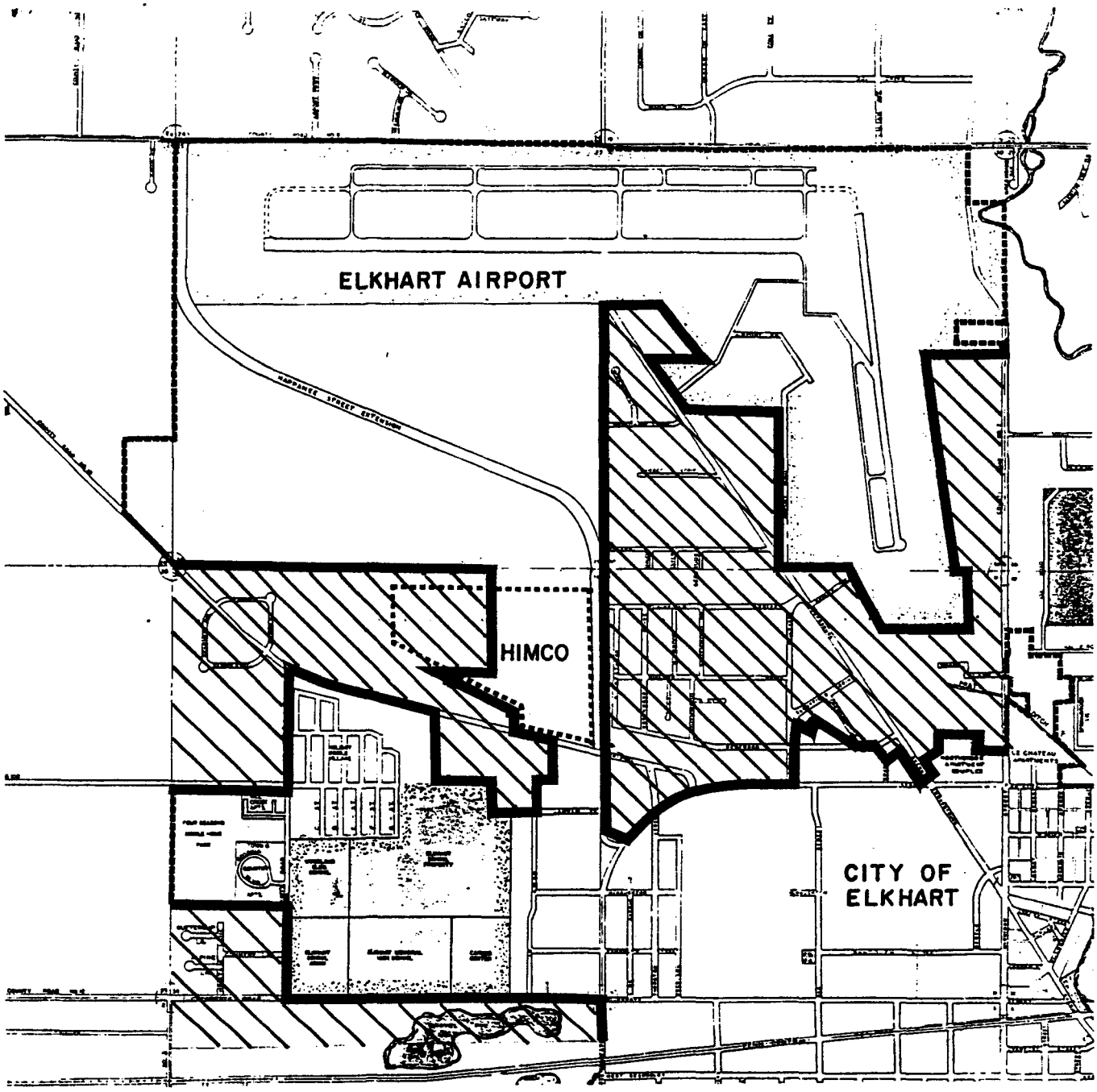
Introduction

A private well inventory was conducted in the neighborhood to the east and to the southeast of the Himco Dump Superfund Site (Himco) in Elkhart, Indiana. The private well inventory was conducted in stages between July 24 and November 15, 1991 and consisted of a discussion with the General Manager of the Elkhart Water Department, home interviews with five residents who live immediately east of Himco, and a telephone conversation with an individual who owns two businesses southeast of Himco.

The private well inventory was conducted in accordance with Section 4.11 of the Field Sampling Plan Addendum I (FSP), Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991, with the exceptions noted in the Deviations section below.

Private Well Inventory Procedures

On July 24, 1991, Bill Schaefer met with the General Manager of the Elkhart Water Department, Mike Terlep. Mr. Terlep was asked to delineate the service boundaries of the Elkhart municipal water supply system near Himco. Mr. Terlep provided Donohue with an Elkhart Water System map showing the areas served by municipal water (Figure 1). As shown in Figure 1, residences and businesses south of Himco are served by municipal water. However, the subdivision immediately east of Himco is not connected to the municipal water supply. Mr. Terlep verified this fact. There are no residences of businesses immediately north or west of Himco.



LEGEND

AREA NOT SERVICED BY
CITY OF ELKHART WATER

NOT TO SCALE

CITY OF ELKHART
WATER DEPARTMENT
SERVICE NEAR SITE

HIMCO DUMP
SUPERFUND SITE
ELKHART, INDIANA

FIGURE 1

Donohue ENGINEERS
ARCHITECTS
SCIENTISTS

On November 19, 1991, Donohue employees Bill Schaefer and Steve Padovani interviewed in person the owners of five homes located in the subdivision immediately east of Himco. The five home owners are listed below and are located by number on Figure 2. All addresses are in Elkhart, Indiana, 46514.

1. Harold Williamson
   54162 Westwood Drive

2. Ronald Burns
   54179 Westwood Drive

3. Sally Leslie
   54305 Westwood Drive

4. Irene and Jerry Eary
   27947 Westwood Drive

5. Bill Bersing
   27964 Westwood Drive

On November 19, 1991, Donohue could not contact the owner of two businesses southeast of Himco, Mr. Bob Conde. However, on November 21, 1991, Bill Schaefer was able to contact Mr. Conde and conducted a telephone interview with him. Each of Mr. Conde's businesses has its own well. The businesses are listed below and are located by number on Figure 2.

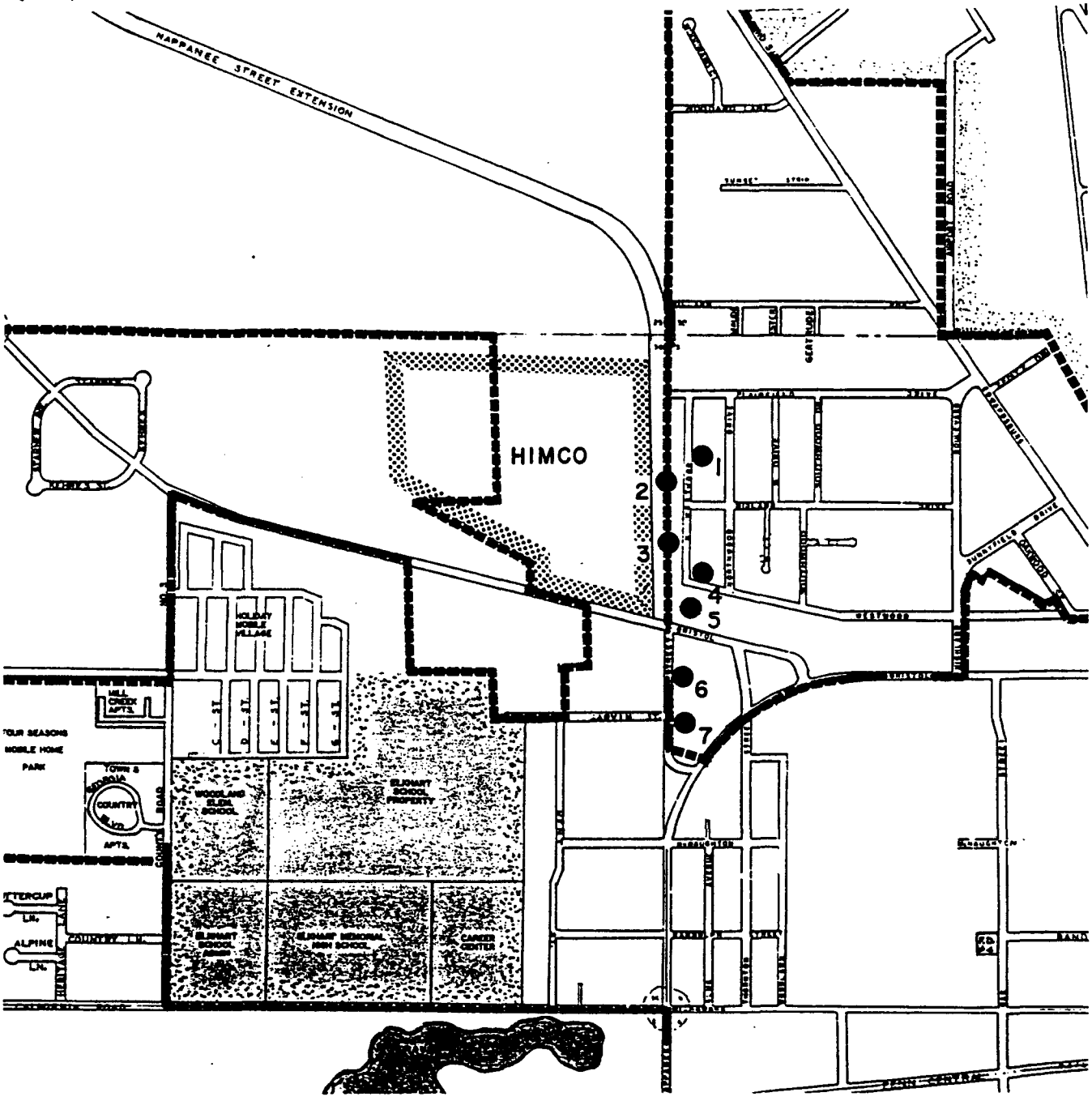
6. J & C Water Systems
   1241 North Nappanee Street
   Elkhart, Indiana 46514

7. MHS Supply
   1631 W. Bristol
   Elkhart, Indiana 46514

Donohue completed Well Inventory Sheets based on the information obtained from the conversation with the owner of each home and business. The Well Inventory Sheets are provided in the Appendix.

Private Well Inventory Results

Five home owners and the owner of two businesses were interviewed regarding seven private wells located east and southeast of Himco.



LEGEND

● 1 PRIVATE WELL— REFER TO TECHNICAL MEMO 21 TEXT FOR NAME AND ADDRESS OF WELL OWNER

NOT TO SCALE

LOCATIONS OF PRIVATE WELLS INCLUDED IN INVENTORY

HIMCO DUMP
SUPERFUND SITE
ELKHART, INDIANA

FIGURE 2

Donohue ENGINEERS ARCHITECTS SCIENTISTS

Four of the well owners (1, 3, 4, and 6) reported problems with drinking water quality, such as "bad" taste, or "rotten egg" odor. Two of these four well owners (3 and 6) currently purchase bottled drinking water. None of the well owners reported sickness associated with using the well water.

Four well owners (2, 3, 4, and 5) did not know the depth of their well. The table below lists the depths of the wells 1, 6, and 7 as provided by the well owner.

Well Number	Owner	Depth (ft.)
1	Williamson	125
6	Conde	27
7	Conde	196

Deviations from the Field Sampling Plan

The FSP states that approximately five residences or light industries southeast of the site will be inventoried. The area southeast of the site which is not served by municipal water is a small triangular area bounded by Nappanee St. Extension on the west, Bristol St. on the north, and Nappanee St on the southeast. Donohue identified only one residence and three active businesses in this area. The owner of two of the businesses (6 and 7) was contacted and interviewed. Donohue was unable to contact the owner of the other business and the one resident in the triangle.

A/R/HIMCO/AJ6

APPENDIX

WELL INVENTORY FORMS

(1)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: Himco Date: 11/19/91

Recorded by: Bill Schaefer Project No. 20026

(1.) Owner/Name: Harold Williamson

(2.) Address: 54162 Westwood Dr

3. Is this well acceptable for inventory? Yes

4. If no, why?

5. Depth to static water level (T.O.P.): N/A

6. Height of T.O.P. above ground surface: N/A

(7.) Use of well: (domestic), stock, abandoned

(8.) Problems with yield reported by Owner: (Yes) No Summ 91 changed screen, gravelled to the point of very low yield

(9.) Problems with water quality reported by Owner: Yes No (Sometimes)

a. Taste - 25 years been here - tastes the same
b. Smell - sometimes smells funny - cant describe smell
c. Color No
d. Sickness No

10. Sample taken: Yes (No)

a. Temperature _____ °F °C
b. pH _____
c. Conductivity _____ micromhos/cm
d. Smell
e. Color
f. Sample taken from tap, storage tank _____
g. After _____ minutes of running

11. Driller: Champion

12. Driller's Address:
Goshen

13. Type of Well: Dug (Drilled)

14. Date Completed: New well point Summer 1991

15. Depth: 125'

16. Diameter of Surface Casing: Not Known

17. Diameter of Inner Casing: Not Know

18. Type of Casing: Steel PVC

19. Is the well screened? (Yes) No
   a. Length:
   b. Depth: from _____ to _____
   c. Slot Size:
   d. Type: SS PVC _____
   e. Gravel Packed Yes No

20. Yield in gpm: Rept. _____ Measured _____
How measured _____

21. Drawdown _____ ft. after _____ hrs/mins of pumping

22. Acquifer:

23. Remarks: Commented on bad smell coming from Himco Dump during summer especially

* Attach Original Well Log *

(2)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: Himco Date: 11/19/91

Recorded by: S. Padovani Project No. 20026

1. Owner/Name: Ronald Burns
2. Address: 54179 W. Westwood
3. Is this well acceptable for inventory? Yes
4. If no, why?
5. Depth to static water level (T.O.P.): Unknown
6. Height of T.O.P. above ground surface: 3"
7. Use of well: domestic, stock, abandoned
8. Problems with yield reported by Owner: Yes (No)
9. Problems with water quality reported by Owner: (Yes) (No)
   a. Taste
   b. Smell
   c. Color
   d. Sickness
10. Sample taken: Yes (No)
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. Driller: ?

12. Driller's Address:

13. Type of Well: Dug (Drilled)

14. Date Completed:

15. Depth: ? Unknown

16. Diameter of Surface Casing: 2 1/4"

17. Diameter of Inner Casing: 2"

18. Type of Casing: (Steel) PVC

19. Is the well screened? (Yes) No
    a. Length: Unknow
    b. Depth: from _____ to _____ Unknown
    c. Slot Size: Unknown
    d. Type: SS PVC _____ Unknown
    e. Gravel Packed Yes No unknow

20. Yield in gpm: Rept. ? gpm Measured _____ Unknown
    How measured _____

21. Drawdown _____ ft. after _____ hrs/mins of pumping Unknown

22. Acquifer: Unknown

23. Remarks:
    well was "cleaned" last year. No more info.

(* Attach Original Well Log *)

(3)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: Hilmo Date: 11/14/91

Recorded by: S. Padovani Project No. 20026

1. Owner/Name: Sally Leslie
2. Address: 54305 Westwood

3. Is this well acceptable for inventory? yes
4. If no, why?
5. Depth to static water level (T.O.P.): Unknown
6. Height of T.O.P. above ground surface: 10"
7. Use of well: (domestic), stock, abandoned
8. Problems with yield reported by Owner: Yes (No)
9. Problems with water quality reported by Owner: (Yes) No
   Use bottled water
   a. Taste – bad taste
   b. Smell rotten eggs
   c. Color - yellowish tint
   d. Sickness - No

10. Sample taken: Yes (No)
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. **Driller:** ? unknown

12. **Driller's Address:** ? unknown

13. **Type of Well:** Dug (Drilled)

14. **Date Completed:** ? unknown

15. **Depth:** ? unknown

16. **Diameter of Surface Casing:** 2 1/4"

17. **Diameter of Inner Casing:** unknown

18. **Type of Casing:** (Steel) PVC

19. **Is the well screened?** Yes No
    a. **Length:**
    b. **Depth: from** _____ **to** _____ ? unknown
    c. **Slot Size:**
    d. **Type:** SS PVC _____
    e. **Gravel Packed** Yes No

20. **Yield in gpm: Rept.** _____ **Measured** _____ unknown ?
    How measured _____

21. **Drawdown** _____ **ft. after** _____ **hrs/mins of pumping** unknown

22. **Acquifer:** unknown

23. **Remarks:** Owner commented on bad smell ("rotten eggs") from Rimco landfill last summer (1991)

*** Attach Original Well Log ***

(4)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: Himco Date: 11/19/91

Recorded by: B. Schafer Project No. 20026

1. Owner/Name: Jerry Eary - Irene Eary
2. Address: 27947 Westwood Dr

3. Is this well acceptable for inventory?
4. If no, why?
5. Depth to static water level (T.O.P.):
6. Height of T.O.P. above ground surface:
7. Use of well: (domestic), stock, abandoned
8. Problems with yield reported by Owner: Yes (No)
9. Problems with water quality reported by Owner: (Yes) No
   a. Taste Bad
   b. Smell - Not sure
   c. Color Clear
   d. Sickness No, not sick from water
10. Sample taken: Yes (No)
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. **Driller:** unk

12. **Driller's Address:** unk

13. **Type of Well:** Dug (Drilled)

14. **Date Completed:** Not Known

15. **Depth:** Not Known

16. **Diameter of Surface Casing:** unk

17. **Diameter of Inner Casing:** unk

18. **Type of Casing:** Steel PVC unk

19. **Is the well screened?** (Yes) No
    a. **Length:**
    b. **Depth: from** _____ **to** _____
    c. **Slot Size:**
    d. **Type:** SS PVC _____
    e. **Gravel Packed** Yes No

20. **Yield in gpm: Rept.** unk **Measured** _____
    How measured _____

21. **Drawdown** _____ **ft. after** _____ **hrs/mins of pumping**

22. **Acquifer:**

23. **Remarks:**

*** Attach Original Well Log ***

(5)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: Hiraco Date: 11/19/91

Recorded by: B. Schaefer Project No. 20026

1. Owner/Name: Bill Bersing
2. Address: 27964 Westwood Dr
3. Is this well acceptable for inventory? Yes
4. If no, why?
5. Depth to static water level (T.O.P.): N/A
6. Height of T.O.P. above ground surface: Not Known
7. Use of well: (domestic), stock, abandoned
8. Problems with yield reported by Owner: (Yes) No
9. Problems with water quality reported by Owner: Yes (No)
   a. Taste Fine
   b. Smell None
   c. Color Clear
   d. Sickness None
10. Sample taken: Yes (No)
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. **Driller:** None Known

12. **Driller's Address:** Not Known

13. **Type of Well:** Dug (Drilled)

14. **Date Completed:** Not Known

15. **Depth:** None

16. **Diameter of Surface Casing:** Unknown

17. **Diameter of Inner Casing:** unknown

18. **Type of Casing:** Steel PVC unknown

19. **Is the well screened?** (Yes) No
    a. **Length:**
    b. **Depth: from** _____ **to** _____
    c. **Slot Size:**
    d. **Type: SS PVC** _____
    e. **Gravel Packed Yes No**

20. **Yield in gpm: Rept.** Unk. **Measured** _____
    How measured _____

21. **Drawdown** _____ **ft. after** _____ **hrs/mins of pumping**

22. **Acquifer:**

23. **Remarks:**

*** Attach Original Well Log ***

(6)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: HIMCO Date: 11/21/91

Recorded by: Schaefer Project No. 20026.024

1. Owner/Name: BOB CONDE / J & C Water Systems
2. Address: 1241 N. NAPPANEE
   ELKHART, IN 219/262-4707
3. Is this well acceptable for inventory? YES
4. If no, why?
5. Depth to static water level (T.O.P.): NOT MEASURED
6. Height of T.O.P. above ground surface: NOT SURVEYED
7. Use of well: [domestic,] stock, abandoned, [business]
8. Problems with yield reported by Owner: Yes [No]
9. Problems with water quality reported by Owner: [Yes] No
   a. Taste - "Poor"
   b. Smell - Sulfur - Rotten Eggs
   c. Color - Brown after sitting for awhile
   d. Sickness - None
10. Sample taken: Yes [No]
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. **Driller:** UNK

12. **Driller's Address:** UNK

13. **Type of Well:** Dug **Drilled**

14. **Date Completed:** UNKNOWN

15. **Depth:** 27'

16. **Diameter of Surface Casing:** UNK

17. **Diameter of Inner Casing:** UNK

18. **Type of Casing:** Steel PVC UNK

19. **Is the well screened?** Yes No
    a. **Length:**
    b. **Depth:** from _____ to _____
    c. **Slot Size:**
    d. **Type:** SS PVC _____
    e. **Gravel Packed** Yes No

20. **Yield in gpm:** Rept. UNK Measured _____
    How measured _____

21. **Drawdown** _____ **ft. after** _____ **hrs/mins of pumping**

22. **Acquifer:**

23. **Remarks:** Owner stated "Bad water because Miles dumped Waste at Himco"

* Attach Original Well Log *

Owner purchases bottled water

(7)

Well Inventory Sheet
Donohue & Associates, Inc.

Site: HIMCO Date: 11/21/91

Recorded by: SCHAEFER Project No. 20026.024

1. Owner/Name: BOB CONDE / MHS Supply
2. Address: 1631 W. Bristol
   Elkhart, IN 219/262-3546
3. Is this well acceptable for inventory? YES
4. If no, why?
5. Depth to static water level (T.O.P.): NOT MEASURED
6. Height of T.O.P. above ground surface: NOT SURVEYED
7. Use of well: [domestic], stock, abandoned, [business]
8. Problems with yield reported by Owner: Yes [No]
9. Problems with water quality reported by Owner: Yes [No]
   a. Taste FINE
   b. Smell NONE
   c. Color CLEAR
   d. Sickness NONE
10. Sample taken: Yes [No]
    a. Temperature _____ °F °C
    b. pH _____
    c. Conductivity _____ micromhos/cm
    d. Smell
    e. Color
    f. Sample taken from tap, storage tank _____
    g. After _____ minutes of running

11. Driller: Welty & Sons, Inc.

12. Driller's Address: 19577 Co Rd 46
New Paris IN 219 831 2538

13. Type of Well: Dug [Drilled]

14. Date Completed: 4/11/91

15. Depth: 196'

16. Diameter of Surface Casing: UNK

17. Diameter of Inner Casing: UNK

18. Type of Casing: Steel PVC

19. Is the well screened? Yes No
    a. Length:
    b. Depth: from _____ to _____
    c. Slot Size:
    d. Type: SS PVC _____
    e. Gravel Packed Yes No

20. Yield in gpm: Rept. _____ Measured _____
    How measured _____

21. Drawdown _____ ft. after _____ hrs/mins of pumping

22. Acquifer:

23. Remarks: Very Good water according to owner

* Attach Original Well Log *

ORIGINAL

TECHNICAL MEMORANDUM - N0. 22

DATE: November 13, 1991

TO: Vanessa Harris, Site Manger

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Bill Schaefer

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

SURFICIAL SOIL SAMPLING

Introduction

Between September 10-19, 1991, 14 surficial soil samples were collected for chemical and geotechnical analysis during the Phase II Remedial Investigation at the Himco Dump site in Elkhart, Indiana.

The soil samples were analyzed for volatile organic compounds (VOA), base/ neutral/acid extractable compounds (BNA), polychlorinated biphenyls/pesticides (PCB/P), total metals/cyanide, total organic carbon and grain size.

Sample Locations/Purpose

The surficial soil samples were collected from five separate areas of the Himco Dump site:

- the west edge of the L pond
- a sand road frequented by dirt bike riders, referred to as the dirt bike trail
- an asphalt pile
- the wetland remnant south of the main landfill area, referred to in this technical memorandum as the polynuclear aromatic (PNA) compound area
- the wetland immediately south of the quarry pond

The samples west of the L pond were collected to determine if rain water runoff from the landfill cap and flooding of the L pond has affected off-site areas to the west of the L pond.

The samples on the dirt bike trail were collected to investigate potential contamination which could affect the trial users.

The sample from the asphalt pile was collected to investigate potential contamination of soil by polynuclear aromatic (PNA) compounds as a result of asphalt debris.

Soil samples were collected from the runoff remnant south of the landfill area based on the rationale presented in the memorandum included as Appendix B.

Soil samples were collected from the wetland south of the quarry pond to chemically characterize the soil in this wetland.

The following table lists the surficial soil samples collected during Phase II:

Sample ID	Date	Location
HD-HS01-01	9/16/91	west edge of L pond
HD-HS02-01	9/16/91	west edge of L pond
HD-HS03-01	9/19/91	dirt bike trail
HD-HS04-01	9/19/91	dirt bike trail
HD-HS05-01	9/19/91	dirt bike trail
HD-HS06-01	9/19/91	asphalt pile(1)
HD-HS07-01	9/19/91	PNA area(1)
HD-HS08-01	9/19/91	PNA area(1)
HD-HS09-01	9/19/91	PNA area(1)
HD-TL3DS1-01	9/12/91	PNA area(1)
HD-TL3DS2-01	9/12/91	PNA area(1)
HD-WS17-01	9/10/91	wetland south of quarry pond
HD-WS18-01	9/10/91	wetland south of quarry pond
HD-WS19-01	9/10/91	wetland south of quarry pond

(1) These soil samples were not specified to be collected in the Phase II Field Sampling Plan. Refer to the Nonconformances section below for explanation.

Sampling Procedures

Surficial soil samples were collected by Anya Kirykowicz, Kim Elias and Bill Schaefer of Donohue & Associates, Inc. Surficial soil samples were collected in accordance with Section 4.13.3 of the Field Sampling Plan Addendum I (FSP), Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991, with the exceptions noted in the Nonconformances section below. Completed Soils Data Forms are included in Appendix A.

With the exception of soil samples HD-HS06-01, HD-TL3DS1-01 and HD-TL3DS2-01, all soil samples were collected using a stainless steel hand auger. Soil from the first hand auger bucket collected from each sample location was transferred directly into VOA sample jars using a stainless steel spoon. Additional soil was then collected and placed into a stainless steel bowl and mixed with the spoon until a homogeneous mixture was obtained.

If present, gravel and twigs were removed from the soil mixture. The soil mixture was divided into four quadrants and portions of each quadrant were taken and placed into the remaining sample jars. The hand auger hole was monitored for organic vapors with an HNu photoionization detector. Organic vapor levels greater than background were not detected in any hand auger hole.

Sample HD-HS06-01 was collected from the side of an asphalt pile located 75 feet north of the drum storage area. To collect this sample, a piece of asphalt approximately 3 feet long, 2 feet wide, and 2 inches thick was removed from the side of the asphalt pile exposing soil beneath. The soil was then transferred directly into VOA jars using a stainless steel spoon. Additional soil was placed in a stainless steel bowl and mixed until homogenized. The remaining soil jars were then filled. A hand auger was not used to collect this sample.

Samples HD-TL3DS1-01 and HD-TL3DS2-02 were collected during the excavation of trench TL-3 at a depth of 2 feet and 6 feet, respectively. When trench TL-3 had been excavated to these two depths as measured with a tape measure, the trackhoe operator was given a signal that a soil sample was to be collected. The operator filled the trackhoe bucket with soil from the desired depth and set the bucket on the ground to allow Donohue staff to collect the sample. The soil was transferred directly from the trackhoe bucket into sample jars, VOA jars first, using a stainless steel spoon. Because the soil in the bucket appeared homogeneous, mixing of the soil did not take place.

Soil sample locations, with the exception of locations HD06, HD07, HD08, and HD09, were staked and later surveyed by a subcontractor survey team. The four locations not surveyed by the subcontractor were located by Donohue by measuring the distance between each location and a known point, such as a grid line intersection point.

Quality Control Samples

One quality control (QC) sample was collected during surficial soil sampling. The QC sample collected was a field duplicate from location HD-HS05.

Decontamination

Before surficial soil sampling and between sampling locations, the soil sampling equipment (hand augers, bowls, spoons) was decontaminated with: (1) an Alconox and distilled water wash, (2) a distilled water rinse, (3) an isopropanol rinse, and (4) two distilled water rinses. Isopropanol rinses were containerized and allowed to evaporate. Isopropanol rinse that had not evaporated by the end of Phase II field work was poured into a 55-gallon drum. The drum was labeled "Wastewater 9/91" and placed in the locked drum storage area. All distilled water used in decontamination was Hinckley & Schmitt brand.

Nonconformances with the Field Sampling Plan

Five surficial soil samples were collected from the wetland remnant present south of the Himco Dump and north of County Road 10. These five samples were not specified in the FSP, but were added to the sampling program based on discussions between Donohue staff

and Bob Lance, the RPM. Mr. Lance approved the collection of the five samples prior to the beginning of Phase II field work. The rationale for collecting these samples is presented in the memorandum included in Appendix B.

One surficial soil sample was collected from the side of an asphalt pile. The decision to collect this sample was made in the field by Bill Schaefer and Mansour Ghiasi. The sample was collected to determine whether asphalt piles present at Himco are possible sources of PNA contamination.

The decontamination procedure for soil sampling equipment specified in the FSP included an Alconox and water wash, and a tap water rinse. Due to its availability, distilled water was substituted for tap water during decontamination of sampling equipment.

Soil Samples Split with Miles Laboratory

Six surficial soil samples were split with Miles Laboratory, through Miles' consultant, Engineering Science, of Oak Brook, Illinois. The six samples split with Miles were: HD-HS03-01, HD-HS04-01, HD-HS05-01, HD-WS17-01, HD-WS18-01 and HD-WS19-01. Donohue's soil sample bottles and Miles' bottles were filled with sample material alternately.

BS:ds

A/R/HIMCO/AG3

APPENDIX A

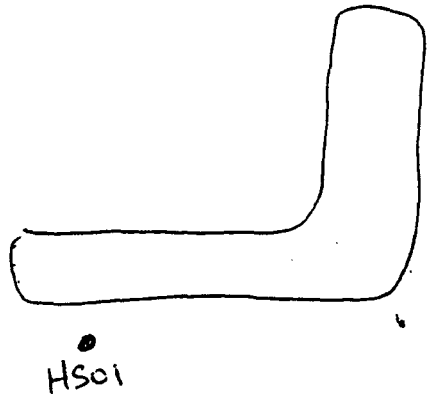
SOILS DATA FORMS

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area Pond Runoff
Soil Subsample HS01

Engineers & Architects & Scientists | Site Himco II | Project No. 20026

DATE 9/16/91
TIME 1545
COLLECTOR Schaefer



SAMPLE DEPTH 0-6"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Approx 30' west of west edge of L shaped pond

DESCRIPTION OF SUBSAMPLE: brown sand some gravel no man made debris in sample

ANY OTHER CHARACTERISTICS OF NOTE: Sample collected using SS. hand auger bowl trowel

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area Pond Runoff

Soil Subsample HS02

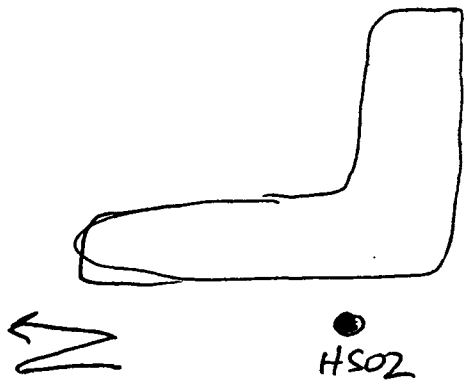
Engineers & Architects & Scientists | Site Himco II | Project No. 20026

DATE 9/16/91

TIME 1600

COLLECTOR Schaefer

SAMPLE DEPTH 0-6"



PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: Approx 30' west of west edge of L shaped pond

DESCRIPTION OF SUBSAMPLE: brown med. sand some gravel

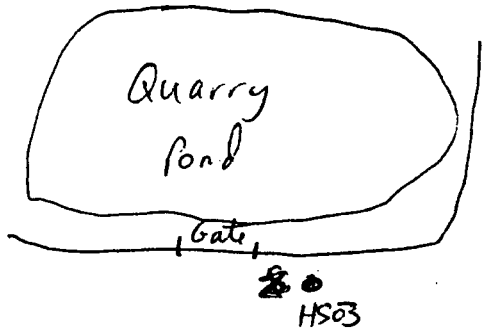
ANY OTHER CHARACTERISTICS OF NOTE: Sample collected using a hand auger, bowl, spoon

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area Dirt Bike Trail
Soil Subsample HS03

Engineers & Architects & Scientists | Site Himco II | Project No. 20026

DATE 9/19/91
TIME 0815
COLLECTOR Schaefer
Kirykowicz



SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: rear quarry pond fence along sand road

DESCRIPTION OF SUBSAMPLE: Brown red sand no gravel no man made debris present in sample

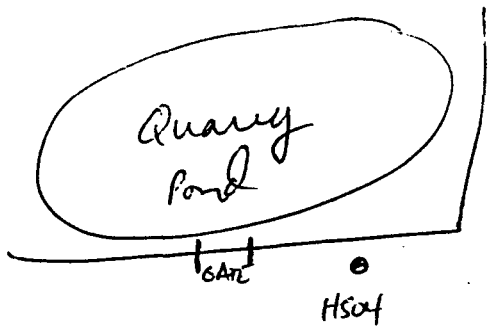
ANY OTHER CHARACTERISTICS OF NOTE: No HNu Lumidor readings at this location. Miles Labs consultant split sample with Donohue

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area Dirt Bike Trail
Soil Subsample HS04

Engineers & Architects & Scientists | Site Himco II | Project No. 20026.023

DATE 9/19/91
TIME 0840
COLLECTOR Schaefer
Kirykowicz



SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: near quarry pond fence along sand road.

DESCRIPTION OF SUBSAMPLE: Brown coarse sand / gravel present no man made debris ~~No man made debris in ps~~

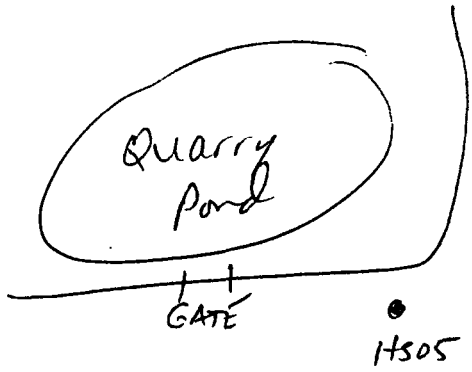
ANY OTHER CHARACTERISTICS OF NOTE: No HNu Lumidor readings at this location Miles Consultant Split Sample

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area Dirt Bike Trail
Soil Subsample HS05

Engineers & Architects & Scientists | Site Himco II | Project No. 20026.023

DATE 9/19/91
TIME 0932
COLLECTOR Schaefer
Kirykowicz



SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: along quarry pond fence

DESCRIPTION OF SUBSAMPLE: brown fine sand no gravel

ANY OTHER CHARACTERISTICS OF NOTE: No HNu or lumidor readings
Miles Consultant split sample with Donohue

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area ____ Soil Subsample HSO6

Engineers & Architects & Scientists | Site Himco Dump | Project No. 20026.025

DATE 19. September. 91

TIME 1020

COLLECTOR Anya Kirykowicz

SAMPLE DEPTH 0 to 4 inches

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: EAST SIDE OF Asphalt pile LOCATED ALONG MAIN ROAD of SITE. Approximately 10 feet West of ROAD AND ~ 75 feet NORTH of DRUM STORAGE AREA

DESCRIPTION OF SUBSAMPLE: BROWN SAND, Small chunks of asphalt and gravel present

ANY OTHER CHARACTERISTICS OF NOTE: I MOVED A PIECE of Asphalt to collect the SAND Sample

NO READINGS ON HNu, Lumisor, OR RAS-MINI

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area PNA area | Soil Subsample HSO7

Engineers & Architects & Scientists | Site Himco II | Project No. 20026.023

DATE 9/19/91

TIME 1350

COLLECTOR Schaefer
Kirykowicz

SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: 15' west of west edge of trench TD-3 in undisturbed area

DESCRIPTION OF SUBSAMPLE: Black gray topsoil roots, hit Calcium sulfate at 1' a small amount of $CaSO_4$ was in this sample - maybe 5-10%

ANY OTHER CHARACTERISTICS OF NOTE: No HNu or Lumidor readings

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area PNA Area
Soil Subsample HS08

Engineers & Architects & Scientists | Site Himco II | Project No. 20026.023

DATE 9/19/91

TIME 1440

COLLECTOR Schaefer
Krykowicz

SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: 10' west of west edge of west edge TL-7 in an area undisturbed by trenching activites

DESCRIPTION OF SUBSAMPLE: Brown fine sand no gravel roots no man made debris

ANY OTHER CHARACTERISTICS OF NOTE: No HNu or lumidor readings

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area PNA area
Soil Subsample HS09

Engineers & Architects & Scientists | Site HIMCO II | Project No. 20026.023

DATE 9/19/91

TIME 1600

COLLECTOR Schaefer
KirykowicZ

SAMPLE DEPTH 0-12"

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: 15' west of west edge of TL-4 in an area undisturbed by trenching activities

DESCRIPTION OF SUBSAMPLE: brown tan medium sand roots No man made debris present in sample

ANY OTHER CHARACTERISTICS OF NOTE: No Hnu or Combustible readings

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area TL-3

Soil Subsample HD-TL3-DS1-01

Engineers & Architects & Scientists | Site HIMCO PHASE II | Project No. 20026.023

DATE 9/12/91

TIME 1335

COLLECTOR Bill Schaefer
Kim Elias

SAMPLE DEPTH 2'

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: This sample was collected from trackhoe bucket using a stainless steel spoon at TL3.

DESCRIPTION OF SUBSAMPLE: Two shades of [2.5/1 (5YR) black and] [3/4 (7.5YR) dark brown] USCS SW well graded ~~sand~~ ~~medium grained~~ BS fine medium silty sand trace gravel

Not Native, looks like fill

ANY OTHER CHARACTERISTICS OF NOTE: No HNu readings from sample surface

SHEET ____ OF ____

Donohue | Soils Data Form | Soil Sample Area TL3

Soil Subsample HP-TL3-DS2-01

Engineers & Architects & Scientists | Site Himco Phase II | Project No. 20026.023

DATE 9/12/91

TIME 1350

COLLECTOR Bill Schaefer
Kim Elias

SAMPLE DEPTH 6'

PHYSICAL DESCRIPTION OF SUBSAMPLING LOCATION: This sample was collected from TL3. The backhoe operator lifted a bucket of soil collected from approximately 6' in depth and the sample was collected directly from the backhoe bucket

DESCRIPTION OF SUBSAMPLE: ~~x~~ 10YR 2/2 Very dark brown silty sand (USCS - SM) with trace gravel.

Not Native, looks like fill

ANY OTHER CHARACTERISTICS OF NOTE: ~~No~~ BS 0.5 ppm OVA reading from sample surface

APPENDIX B

MEMORANDUM - PNA AREA SOIL SAMPLES

MEMORANDUM

DATE: August 16, 1991

TO: Vanessa Harris

FROM: Bill Schaefer

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II
Modified Investigation Strategy in PNA Area

Polynuclear aromatic compounds (PNAs) were detected in three soil samples (WS-13, WS-15 and WS-16) collected during Phase I in the wetland remnant south of the landfill area at Himco Dump. This area will be referred to as the PNA area in this memorandum. According to Life Systems, the presence of PNAs in the PNA area soil poses an unacceptable risk to future residents due to possible soil ingestion. Therefore, the PNA area will need to be considered for remediation during the FS for the site.

The investigation strategy for the PNA as described in the July 1991 Field Sampling Plan (FSP) includes:

1. Excavation of five trenches for leachate sample collection and debris delineation; and

2. Excavation of six trenches for debris delineation, only.

The subsurface information obtained from delineation trench excavations is to be used to develop a total volume calculation to be used in determining a possible remediation method.

The Phase II FSP was written with the assumption that the PNA area consists of one large pile of construction debris with an easily discernible boundary. The area of this pile was thought to generally correspond to the area contaminated with PNAs. Delineation trenches were then proposed at the boundary of the pile and were to be excavated outward away from the pile in an attempt to determine whether construction debris is present in the subsurface beyond the discernible boundary of the pile, and to determine the depth of debris in the pile. However, during a site walk-through, I found that one construction debris pile with an easily discernible outer edge does not exist. Instead, several smaller, discrete piles of debris were observed spread out over the area south of the dump and north of County Road 10. Also present in this area are numerous vegetated mounds and berms which may or may not be soil covered construction debris piles.

Two implications are associated with the numerous smaller piles. First, I no longer believe that we have a good estimate as to the horizontal extent of PNA contamination in this area. Before, I believed that PNA contamination is present in the area of the larger construction debris pile. Because one large pile of debris does not exist, we may actually have several PNA hotspots associated with the several smaller, discrete debris piles observed. The second implication relates to the strategy for determining delineation trench locations during Phase II. Obviously, we will not be able to excavate outward from one debris pile that does not exist, as originally planned.

Therefore, the purpose of this memorandum is to document two proposed modifications to the Phase II FSP.

Modification 1

Three surficial soil samples will be collected from the 0 to 12-inch depth interval near proposed trench locations TL-4, TL-7 and TD-3, as shown on Figure 4-4 of the July 1991 Phase II FSP. These three samples surround the area outlined by the Phase I samples WS-13, WS-15 and WS-16 and should provide us with a better idea of the horizontal extent of PNA contamination. In addition, two subsurface samples will be collected during the excavation of trench TL-3. The first sample will be collected from a depth of approximately 2 feet and the second from a depth of 6 feet. Trench TL-3 is located roughly in the middle of samples WS-13, WS-15 and WS-16. These two subsurface soil samples will provide us with some idea as to the vertical extent of PNA contamination.

The proposed soil samples will be analyzed for TCL VOAs, BNAs and PCP/P, TAL Metals/CN, TOC and grain size.

Modification 2

Actual trench locations will differ from those shown on Figure 4-4. Our objective now is to determine the vertical and horizontal extent of several smaller debris piles as opposed to one larger pile. This will necessitate a different trenching strategy. Instead of excavating approximately 10 trenches surrounding one larger debris pile, we will excavate one or possibly two trenches around each of the smaller piles. There are also numerous berms and mounds in this area which will be investigated using the backhoe.

It should be mentioned that the leachate trench (TL-1 through TL-7) locations shown in Figure 4-4 will not be changed. Only the locations of delineation trenches (TD-1 through TD-6) will be affected.

BS:llw

A/O/M/DF5

TECHNICAL MEMORANDUM - NO 23

ORIGINAL

DATE: November 4, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Bill Schaefer

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

SURFACE WATER/SEDIMENT SAMPLING

Introduction

Nine surface water and nine sediment samples were collected by Anya Kirykowicz, Tracey Koach, and Bill Schaefer of Donohue & Associates, Inc. The samples were collected in accordance with Section 4.12.3 of the Field Sampling Plan Addendum I (FSP), Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991, with the exceptions noted in the Nonconformances section below.

The surface water and sediment samples were collected between September 16-19, 1991 during the Phase II Remedial Investigation at the Himco Dump site in Elkhart, Indiana.

Surface water samples were analyzed for volatile organics (VOA), base/neutral/acid extractable compounds (BNA), polychlorinated biphenyls/pesticides (PCB/P), total and dissolved metals/cyanide, water quality parameters, and dissolved bromide. Sediment samples were analyzed for VOA, BNA, PCB/P, total metals/cyanide, total organic carbon and grain size.

Sample Locations

Surface water and sediment samples were collected from three on-site ponds and one off-site background pond. The on-site ponds are referred to as the L pond, the small pond, and the quarry pond. The background pond is located 2.2 miles northwest of the center of the quarry pond and is owned by Daniel Wang. His address and phone number are: 28910 County Road 10, Granger, Indiana, 46530, (219/262-8789). This pond was chosen for background use because it is the closest pond to the Himco Dump (1) with the same wetland classification (POWGx) as the Himco ponds and (2) is located in an area where no known landfilling, dumping or industrial activity has occurred. The wetland classification POWGx is an abbreviation: P designates a Palustrine system wetland, OW designates an open water/unknown bottom wetland class, G designates an intermittently exposed wetland, and x designates an excavated wetland.

The following table lists the surface water and sediment samples collected during Phase II. The prefix SS designates a surface water sample; the prefix SD designates a sediment sample. Surface water and sediment samples were collected from the same locations in each pond.

Sample ID	Date	Location
HD-SS08-02	9/16/91	small pond(1)
HD-SS09-02	9/19/91	quarry pond(1)
HD-SS10-02	9/19/91	quarry pond(1)
HD-SS13-01	9/16/91	L pond
HD-SD13-01	9/16/91	L pond
HD-SS14-01	9/16/91	L pond
HD-SD14-01	9/16/91	L pond
HD-SS15-01	9/17/91	small pond
HD-SD15-01	9/17/91	small pond
HD-SS16-01	9/17/91	quarry pond
HD-SD16-01	9/17/91	quarry pond
HD-SS17-01	9/17/91	quarry pond
HD-SD17-01	9/17/91	quarry pond
HD-SS18-01	9/17/91	quarry pond
HD-SD18-01	9/17/91	quarry pond
HD-SS19-01	9/18/91	background pond
HD-SD19-01	9/18/91	background pond
HD-SS20-01	9/18/91	background pond
HD-SD20-01	9/18/91	background pond
HD-SS21-01	9/18/91	background pond
HD-SD21-01	9/18/91	background pond

(1) Surface water samples had been collected from locations SS08, SS09 and SS10 during Phase I, but the VOA portions of the Phase I samples were lost due to a break in sample chain of custody. During Phase II, surface water samples for VOA analysis only were recollected from the three locations.

Completed Surface Water Data Forms are included in Appendix A. Water Quality Profile Forms are included in Appendix B. Sediment Grab Data Forms are included in Appendix C.

Sampling Procedures

A 12-foot rowboat was rented from a local marina and towed to each pond using an ARCS vehicle. The boat was launched in the pond to be sampled and rowed to the desired sampling location. A gasoline or electric motor was not used at any time. Upon arrival at a sampling location, front and rear anchors were dropped to keep the boat from drifting. Surface water samples were collected before the sediment samples at all locations.

Once anchored, a YSI temperature/level/conductivity meter was used at each sample location to measure the water temperature every two feet in depth, conductivity at the pond surface and bottom, and the depth of the pond. A dissolved oxygen (D.O.) meter was

used to measure the D.O. at the pond surface and bottom. A pH meter was used to measure the pH at the pond surface. The table below summarizes the depth of the pond at each sample location. Temperature, conductivity, D.O., and pH measurements are recorded on the forms in Appendices A and B.

Pond	Sample Location	Pond Depth (feet)	Temp. Difference (°C) Surface minus Bottom
L	SS13, SD13	5.3	1.5
L	SS14, SD14	9.1	1.0
small	SS15, SD15	2.0	0.5
quarry	SS16, SD16	26.5	4.8
quarry	SS17, SD17	25.2	3.4
quarry	SS18, SD18	30.1	5.8
background	SS19, SD19	9.1	2.1
background	SS20, SD20	12.4	6.7
background	SS21, SD21	6.0	8.1

Samples SS14 and SD14 were collected from the deepest location found in the L pond, 9.1 feet. The small pond is no greater than 2.0 feet deep at any point.

As can be seen from the above table, the greatest temperature difference between the surface and bottom of any of the ponds was 8.1° C. If a temperature difference of 9° C or greater would have been measured at a sampling location, the Phase II FSP required two surface water samples be collected at that location, one on the surface of the pond and one near the bottom of the pond.

Once the required water quality parameters were measured and recorded at each location, the surface water sample was collected by lowering the sample bottle opening to just below the water surface and allowing the water sample to drain in, without the creation of air bubbles. Once full, the bottle was capped beneath the water surface and brought back into the boat where it was placed in a cooler with ice to be transported back to the field trailer. VOA vials were filled first at all locations

After collection of a surface water sample, a sediment sample was collected at the same location using a stainless steel Ekman dredge manufactured by the Wildco Company of Saginaw, Michigan. The dredge was lowered over the side of the rowboat and allowed to settle on the pond bottom. One or two messengers were then attached and sent down the dredge haul line to trip the dredge to close. The dredge was then hauled to the surface and placed on the edge of the rowboat and opened. If sediment was successfully collected by the dredge, sample jars for VOA analysis were filled directly from the dredge using a stainless steel spoon. Any sediment remaining in the dredge was emptied into a stainless steel bowl. If more sediment volume was required to fill all the required bottles, the dredge was reset and lowered to the bottom of the pond to collect the additional volume. At several locations the dredge was hauled up to the edge of the rowboat, but was found to

be filled with seaweed or sticks, not sediment. In these cases, the dredge was repeatedly lowered until adequate sediment volume was collected. The Ekman dredge was eventually successful in collecting adequate sediment volume at all sample locations due to the soft sediments encountered. A much heavier Ponar dredge was available but was not needed. Once a sufficient volume of sediment was collected in the bowl, the sediment was mixed with the spoon until a homogenous mixture was obtained. The sediment mixture was then roughly divided into quarters, with portions from each quarter being used to fill the remaining sample bottles. A visual description of the sample was recorded on a Sediment Grab Data Form, included in Appendix C.

Visual evidence of contamination was not apparent in any surface water or sediment sample collected during Phase II.

Quality Control Samples

The following quality control samples were collected during surface water sampling. A duplicate sample and a matrix spike/matrix spike duplicate sample were collected at location SS-15. One field blank sample was collected by pouring distilled water directly into the required sample bottles. Four trip blank samples were made by pouring distilled water into VOA vials. The filled vials were then transported in coolers alongside sample bottles to and from sampling locations. The distilled water used was Hinckley & Schmitt brand.

During sediment sampling, a duplicate sample was collected at location SD-15.

Decontamination

The Ekman dredge and stainless steel spoons and bowls were decontaminated between sampling locations by (1) an Alconox and distilled water wash, (2) a distilled water rinse, (3) an isopropanol rinse, and (4) two distilled water rinses. Isopropanol rinses were containerized and allowed to evaporate. Isopropanol rinse that had not evaporated after the conclusion of Phase II field work was poured into a 55-gallon drum. The drum was labeled "Wastewater 9/91" and placed in the locked drum storage area.

Nonconformances with the Field Sampling Plan

The sediment sampling procedures provided in the FSP included dredge sampling for benthic organism identification. The benthic organism identification was to be completed by an ecologist and was to occur concurrently with sediment sampling for chemical analysis. The individual scheduled to conduct the benthic organism identification was Chick Steiner, an ecologist with U.S. EPA. Mr. Steiner was given four weeks notice prior to the scheduled dates of sediment sampling. However, on Monday, September 16, 1991, which was the first day of sediment sampling during Phase II, Mr. Steiner called B. Schaefer at the site trailer and stated that he could not make it to the site until Friday, September, 20. Mr. Steiner stated that the benthic organism identification survey did not need to be done concurrently with sediment sampling for chemical analysis and could be completed in one day. Therefore, the benthic organism survey was completed separately from sediment sampling for chemical analysis. Mr. Steiner was present at Himco on Friday, September 20, and he

and B. Schaefer collected benthic organisms using a hand auger from the shorelines of the L, small, quarry and background ponds. Mr. Steiner was informed to forward his identification report to Mr. Bob Lance, the RPM.

Gravity core samples were to be collected to determine the stratigraphy of the the bottom of the four ponds. Gravity core samples were not collected during Phase II because the gravity core sampler available for use weighed approximately 75 pounds. This sampler was designed to be used with a stable boat equipped with a downrigger or winch, neither of which is feasible for use in a 12-foot rowboat. The rowboat used during Phase II had a good chance of capsizing if the 75 pound gravity core sampler would have been used.

The decontamination procedure for sediment sampling equipment specified in the FSP included and Alconox and water wash, and a tap water rinse. Due to its availability, distilled water was substituted for tap water during decontamination of sampling equipment. The bottom of the rowboat was sprayed with distilled water, not tap water, when removed from each pond.

Surface Water and Sediment Samples Split with Miles Laboratory

The surface water and sediment samples collected from the quarry pond were split with Miles Laboratory through Miles' consultant, Engineering Science, of Oak Brook, Illinois. The samples split with Miles were collected from locations: SS16, SD16, SS17, SD17, SS18 and SD18. Donohue's sample bottles and Miles' sample bottles were filled with sample material alternately at these locations.

BS:ds

A/R/HIMCO/AG4

APPENDIX A

SURFACE WATER DATA FORMS

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS08

Engineers & Architects & Scientists **Site** Himco II **Project No.** 20026.03

Date 9/16/91 Sample No. SS08

Time 1608 Water Depth 1 foot

Collector Bill Schaefer Loran–C Coordinates: _____ Lat.

_____ _____ Long.

	Shallow Sample	Deep Sample
pH:	7.83	
Dissolved Oxygen:	1.1 mg/L	
Temperature:	19.6°C	
Conductivity:	0.37 millimho/cm	
Odor:	none	
Clarity:	Algal filled	
Comments:		

Weather: Wind Direction: _____ Cloud Cover: _____

Wind Speed: _____ Precipitation: _____

Temperature: _____ Lake Conditions: _____

Any other characteristics of note Sample collected for VOA analysis only from ~~north~~ east shore of small pond near a stake. The stake is assumed to be the location of SS08 from Phase I

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS09

Engineers & Architects & Scientists **Site** HIMCO PHASE II **Project No.** 20026

Date 9/19/91 **Sample No.** SS09

Time 1040 **Water Depth** ~1'

Collector Bill Schaefer **Loran-C Coordinates:** _____ Lat.

_____ Long.

	Shallow Sample	Deep Sample
pH:	not taken	
Dissolved Oxygen:		
Temperature:		
Conductivity:		
Odor:	None	
Clarity:	Clear	
Comments:	pH, Do temp cond. readings for the quarry pond are included on surface water data forms for SS16, SS17 and SS18	

Weather: **Wind Direction:** _____ **Cloud Cover:** _____

Wind Speed: _____ **Precipitation:** _____

Temperature: _____ **Lake Conditions:** _____

Any other characteristics of note VOA analysis only. Split with Rhonda Yoder of Engineering Science. This sample was collected on north shore of quarry pond near a stake assumed to be the location of SS09 from Phase I.

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS10

Engineers & Architects & Scientists **Site** Himco Phase II **Project No.** 20026

Date 9/19/91 **Sample No.** SS10

Time 1030 **Water Depth** ~ 1 foot

Collector Bill Schaefer **Loran–C Coordinates:** _____ Lat.

_____ Long.

	Shallow Sample	Deep Sample
pH:	Not taken	
Dissolved Oxygen:		
Temperature:		
Conductivity:		
Odor:	None	
Clarity:	Clear	
Comments:	pH, DO, Temp, Cond measurements for the quarry pond are provided on the surface water data sheets for SS16 - SS18.	

Weather: **Wind Direction:** _____ **Cloud Cover:** _____

Wind Speed: _____ **Precipitation:** _____

Temperature: _____ **Lake Conditions:** _____

Any other characteristics of note VOA analysis only. Split with Rhonda Yoder of Engineering Science. Collected on east shore of quarry pond as close to the location shown on Fig 4-46 of the FSP as I could get. The stake showing SS10 location from Phase I could not be found.

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS13

Engineers & Architects & Scientists **Site** Himco Phase II **Project No.** 20026.023

Date 9/16/91 Sample No. SS13

Time 1300 Water Depth 5.3'

Collector Bill Schaefer, Anya Kirykowicz Loran–C Coordinates: ____ Lat. ____ Long.

	Shallow Sample	Deep Sample not collected
pH:	~~meter not functional~~ 8.48	
Dissolved Oxygen:	7.7 mg/L at 5.3'	
Temperature:	24.2°C at surface	
Conductivity:	0.55 mμ/cm	
Odor:	none	
Clarity:	clear	
Comments:	none	

Weather: Wind Direction: South west Cloud Cover: med-heavy

Wind Speed: 10-15 mph Precipitation: light drizzle

Temperature: 75°F. Lake Conditions: ____

Any other characteristics of note numerous fish (blue gill and l.m. bass) observed in L shaped pond

SHEET ____ OF ____

Donohue | **Surface Water Data Form** | **Sample Location Number** SS14

Engineers & Architects & Scientists | **Site** Himco Phase II | **Project No.** 20026.023

Date 9/16/91 | Sample No. SS14

Time 1345 | Water Depth 9.1 ft

Collector Bill Schaefer, Anya Kirykowicz | Loran–C Coordinates: ____ Lat. ____ Long.

	Shallow Sample	Deep Sample
pH:	~~meter not functional~~ 8.27	
Dissolved Oxygen:	8.6 mg/L at surface 5.3 mg/L at 9.1 ft.	
Temperature:	25.0°C at surface 24.0 at 9'	
Conductivity:	0.56 mmho/cm	
Odor:	none	
Clarity:	clear	
Comments:	none	

Weather: Wind Direction: west | Cloud Cover: med

Wind Speed: 15 mph | Precipitation: none

Temperature: 75°F | Lake Conditions: choppy

Any other characteristics of note None

SHEET ____ OF ____

Donohue | **Surface Water Data Form** | **Sample Location Number** SS15

Engineers & Architects & Scientists | **Site** Himco II | **Project No.** 20026

Date 9/17/91 | Sample No. SS15

Time 0730 | Water Depth 1.0 feet

Collector Schaefer, Kirykowicz | Loran–C Coordinates: ____ Lat. ____ Long.

	Shallow Sample	Deep Sample
pH:	7.70	
Dissolved Oxygen:	0.9 mg/L	
Temperature:	19.1°C	
Conductivity:	0.34 millimho/cm	
Odor:	none	
Clarity:	turbid, high algal and bugs	

Comments: Sheen observed on water in small pond, believed to be natural

Weather: Wind Direction: None | Cloud Cover: Slight

Wind Speed: None | Precipitation: none

Temperature: 62°F | Lake Conditions: still

Any other characteristics of note: This sample collected from center of small pond. Small pond is 2 feet deep at ~~its~~ ~~bot~~ maximum. Duplicate sample collected here.

Fish were NOT observed in small pond

SHEET ____ OF ____

Donohue | **Surface Water Data Form** | **Sample Location Number** (5516)

Engineers & Architects & Scientists | **Site** Himco II | **Project No.** 20026

Date 9/18/91 | Sample No. 5516

Time 1055 | Water Depth 26.5 feet

Collector Schaefer, Kirykowicz | Loran–C Coordinates: ____ Lat. ____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	7.86	not taken
Dissolved Oxygen:	8.9 mg/L	1.7 mg/L
Temperature:	23.6 °C	18.8 °C
Conductivity:	0.60 mmho/cm	0.53 mmho/cm
Odor:	none	~~none~~
Clarity:	clear	~~clear~~
Comments:		

Weather: Wind Direction: West | Cloud Cover: slight

Wind Speed: 5-10 mph | Precipitation: none

Temperature: 68 °F | Lake Conditions: ____

Any other characteristics of note bluegill and large mouth bass observed in quarry pond.

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS17

Engineers & Architects & Scientists **Site** Himco II **Project No.** 20026

Date 9/17/91 Sample No. SS17

Time 1228 Water Depth ~~30.1 feet~~ BS 25.2'

Collector Schaefer, Kirykowicz Loran–C Coordinates: _____ Lat. _____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	7.74	
Dissolved Oxygen:	9.3 mg/L	1.4 mg/L
Temperature:	24.5°C	21.1°C
Conductivity:	0.60 mmhos/cm	0.57 mmhos/cm
Odor:	none	
Clarity:	clear	
Comments:		

Weather: Wind Direction: West Cloud Cover: slight

Wind Speed: 5-10 mph Precipitation: none

Temperature: 70°F Lake Conditions: _____

Any other characteristics of note _____

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS18

Engineers & Architects & Scientists **Site** Himco II **Project No.** 20026

Date 9/17/91 Sample No. SS18

Time 1430 Water Depth ~~30.F~~ 30.1 feet

Collector Schaefer, Kirykowicz Loran–C Coordinates: ____ Lat. ____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	7.91	
Dissolved Oxygen:	9.2 mg/L	1.9 mg/L
Temperature:	24.5 °C	18.7 °C
Conductivity:	0.61 mmhos/cm	0.53 mmhos/cm
Odor:	none	
Clarity:	clear	
Comments:		

Weather: Wind Direction: West Cloud Cover: slight

Wind Speed: 5-10 mph Precipitation: none

Temperature: 70°F Lake Conditions: ____

Any other characteristics of note ____

SHEET ____ OF ____

Donohue | **Surface Water Data Form** | **Sample Location Number** SS19

Engineers & Architects & Scientists | **Site** Himco II | **Project No.** 20026

Date 9/18/91 | Sample No. SS19

Time 0857 | Water Depth 9.1 feet

Collector Schaefer, Koach | Loran–C Coordinates: ____ Lat. ____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	9.02	
Dissolved Oxygen:	8.1 mg/L	7.1 mg/L
Temperature:	21.6°C	19.5°C
Conductivity:	1.32 millimhos/cm	1.42 mmhos/cm
Odor:	none	
Clarity:	clear	
Comments:		

Weather: Wind Direction: NW | Cloud Cover: Heavy

Wind Speed: 15 mph | Precipitation: light rain

Temperature: 58°F | Lake Conditions: choppy

Any other characteristics of note Samples SS19, SS20, and SS21 were collected from a pond located on the property of Daniel Wang, approximately 2 miles NW of Himco.

Bluegill and LM BASS and Painted Turtles observed in the Wang pond

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS20

Engineers & Architects & Scientists **Site** Himco II **Project No.** 20036

Date 9/18/91 Sample No. SS20

Time 1020 Water Depth 12.4 feet

Collector Schaefer, Kirykowicz Loran–C Coordinates: _____ Lat. _____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	8.84	
Dissolved Oxygen:	8.7 mg/L	1.3 mg/L
Temperature:	19.1°C	12.4°C
Conductivity:	0.30 mmhos/cm	0.38 mmhos/cm
Odor:	none	
Clarity:	clear	
Comments:		

Weather: Wind Direction: West Cloud Cover: heavy

Wind Speed: 10 mph Precipitation: none

Temperature: 58°F Lake Conditions: _____

Any other characteristics of note Duplicate sample collected here

SHEET ____ OF ____

Donohue **Surface Water Data Form** **Sample Location Number** SS21

Engineers & Architects & Scientists Site Himco II Project No. 20026

Date 9/18/91 Sample No. SS21

Time 1212 Water Depth 6.0 feet

Collector Schaefer, Kirykowicz Loran–C Coordinates: ____ Lat. ____ Long.

	~~Shallow Sample~~ Surface	~~Deep Sample~~ Bottom
pH:	8.68	
Dissolved Oxygen:	8.6 mg/L	1.6 mg/L
Temperature:	20.3°C	12.2°C
Conductivity:	0.29 mmhos/cm	0.41 mmhos/cm
Odor:	none	
Clarity:	clear	
Comments:		

Weather: Wind Direction: NW Cloud Cover: medium

Wind Speed: 5 mph Precipitation: none

Temperature: 60°F Lake Conditions: ____

Any other characteristics of note ____

APPENDIX B

WATER QUALITY PROFILE FORMS

L POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS13 (L SHAPED POND

Site: HIMCO PHASE II Date: 9/16/91

By: SCHAEFER Project No.: 20026.023

Loran-C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran-C Coor: _____ Lat. _____ Long.

Final Loran-C Coor: _____ Lat. _____ Long.

Start Time: 1252

End Time: 1300

Water Depth: 5.3'

Lake Conditions: light drizzle, choppy

Reading Depth	Temperature	pH	Dissolved Oxygen	Conductivity		Comments
0'	24.3°C	8.48	-	0.55 millimhos/cm		- measurement not
2'	24.2	-	-	-		taken
4	24.0	-	-	-		
5.3	22.8	-	7.7 mg/L	0.58 millimhos/cm		
						Temp., pH, DO, cond measurements taken while in a boat using a YSI meter and Hanna pH meter For SS13 - SS21

L POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS14

Site: HIMCO PHASE II Date: 9/16/91

By: SCHAEFER Project No.: 20026.023

Loran-C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran-C Coor: _____ Lat. _____ Long.

Final Loran-C Coor: _____ Lat. _____ Long.

Start Time: 1330

End Time: 1345

Water Depth: 9.1 feet at bottom

Lake Conditions: choppy, heavy clouds

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	25.0	8.27	8.6	0.56		
2	24.8	-	-	-		
4	24.6	-	-	-		
6	24.3	-	-	-		
8	24.1	-	-	-		
9.1	24.0	-	5.3	0.57		

orms.Water Qual

SMALL POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS15

Site: HIMCO PHASE II Date: 9/17/91

By: SCHAEFER Project No.: 20026.023

Loran–C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran–C Coor: _____ Lat. _____ Long.

Final Loran–C Coor: _____ Lat. _____ Long.

Start Time: 0730

End Time: 0735

Water Depth: 1.0 foot

Lake Conditions: _____

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	19.1	7.70	0.9	0.34		Small pond is no more
1.0	18.6	–	–	–		than 2' deep at maximum

QUARRY POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number: SS16

Site: HIMCO PHASE II Date: 9/17/91

By: SCHAEFER Project No.: 20026.023

Loran-C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran-C Coor: _____ Lat. _____ Long.

Final Loran-C Coor: _____ Lat. _____ Long.

Start Time: 1040

End Time: 1055

Water Depth: 26.5 feet to bottom

Lake Conditions: almost still, partly sunn

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	23.6	7.86	8.9	0.60		- measurement not take
2	23.9	-	-	-		at that depth
4	24.0	-	-	-		
6	24.0	-	-	-		
8	24.0	-	-	-		
10	24.0	-	-	-		
12	24.0	-	-	-		
14	24.0	-	-	-		
16	24.0	-	-	-		
18	24.0	-	-	-		
20	23.8	-	-	-		
22	23.3	-	-	-		
24	22.0	-	-	-		
26	20.0	-	-	-		
26.5	18.8	-	1.7	0.53		

QUARRY POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS17

Site: HIMCO PHASE II Date: 9/17/91

By: SCHAEFER Project No.: 20026.023

Loran-C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran-C Coor: _____ Lat. _____ Long.

Final Loran-C Coor: _____ Lat. _____ Long.

Start Time: 1215

End Time: 1225

Water Depth: 25.2 feet to bottom

Lake Conditions: almost still

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	24.5	7.74	9.3	0.60		- measurement not taken
2	24.3	-	-	-		at that depth
4	24.3	-	-	-		
6	24.2	-	-	-		
8	24.2	-	-	-		
10	24.1	-	-	-		
12	24.1	-	-	-		
14	24.1	-	-	-		
16	24.1	-	-	-		
18	24.0	-	-	-		
20	23.9	-	-	-		
22	23.1	-	-	-		
24	21.9	-	-	-		
25.2	21.1	-	1.4	0.57		

QUARRY POND

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Site: HIMCO PHASE II Date: 9/17/91

By: SCHAEFER Project No.: 20026.023

Sample Location Number SS18

Loran–C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran–C Coor: _____ Lat. _____ Long.

Final Loran–C Coor: _____ Lat. _____ Long.

Start Time: 1415

End Time: 1430

Water Depth: 30.1' at bottom

Lake Conditions: _____

Reading Depth (Feet)	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (millimhos/cm)		Comments
0	24.5	7.91	9.2	0.61		- means measurement not taken at that depth
2	24.4	-	-	-		
4	24.4	-	-	-		
6	24.4	-	-	-		
8	24.3	-	-	-		
10	24.3	-	-	-		
12	24.2	-	-	-		
14	24.2	-	-	-		
16	24.1	-	-	-		
18	24.1	-	-	-		
20	23.8	-	-	-		
22	23.1	-	-	-		
24	22.1	-	-	-		
26	19.7	-	-	-		
28	19.1	-	-	-		
30.1	18.7	-	1.9	0.53		

WANG POND (BACKGROUND)

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS19

Site: HIMCO PHASE II Date: 9/18/91

By: SCHAEFER Project No.: 20026.023

Loran–C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran–C Coor: _____ Lat. _____ Long.

Final Loran–C Coor: _____ Lat. _____ Long.

Start Time: 0850

End Time: 0857

Water Depth: 9.1 feet at bottom

Lake Conditions: _____

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	21.6	9.02	8.1	1.32		- measurement not taken
2	21.8	-	-	-		at that depth
4	21.8	-	-	-		
6	21.9	-	-	-		
8	19.8	-	-	-		
9.1	19.5	-	7.1	1.42		

WANG POND (BACKGROUND)

SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number: SS20

Site: HIMCO PHASE II Date: 9/18/91

By: SCHAEFER Project No.: 20026.023

Loran–C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran–C Coor: _____ Lat. _____ Long.

Final Loran–C Coor: _____ Lat. _____ Long.

Start Time: 1015

End Time: 1020

Water Depth: 12.4 feet to bottom

Lake Conditions: choppy, air temp 58°F

Reading Depth (Feet)	°C Temperature	pH	mg/L Dissolved Oxygen	millimhos/cm Conductivity		Comments
0	19.1	8.84	8.7	0.30		Today is the first day
2	21.2	-	-	-		below 60°F we've had
4	21.2	-	-	-		while on-site. Yesterday
6	15.1	-	-	-		9/17/91 was 70°F. The
8	14.2	-	-	-		cold front could account
10	13.4	-	-	-		for the temperature stratif
12	12.7	-	-	-		tion seen.
12.4	12.4	-	1.3	0.38		
						A 3-4 lb. largemouth bass
						seen at SS20 location

WANG POND (BACKGROUND) SHEET _____ OF _____

Donohue

WATER QUALITY PROFILE FORM

Sample Location Number SS21

Site: Himco PHASE II Date: 9/18/91

By: SCHAEFER Project No.: 20026.023

Loran-C Coor: _____ Lat. _____ Long.

Engineers & Architects & Scientists

Initial Loran-C Coor: _____ Lat. _____ Long.

Final Loran-C Coor: _____ Lat. _____ Long.

Start Time: 1205

End Time: 1210

Water Depth: 6.0 feet to bottom

Lake Conditions: _____

Reading Depth (Feet)	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity (millimhos/cm)		Comments
0	20.3	8.68	8.6	0.29		- measurement not taken
2	20.3	-	-	-		
4	13.1	-	-	-		
6	12.2	-	1.6	0.41		

APPENDIX C

SEDIMENT GRAB DATA FORMS

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 20026.023 SD13

DATE 9/16/91

TIME 1320

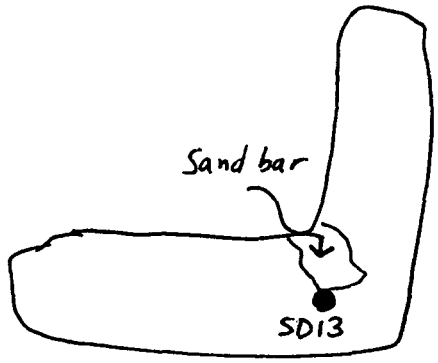
COLLECTOR Bill Schaefer
Anya Kirykowicz

Sample No. SD13

Water Depth ~ 5.5 feet

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman dredge
S.S. Bowl, spoon



PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: brown coarse sand and gravel. Collected on edge of sand bar present as shown in figure above

Weather:
Wind Direction: South - west
Wind Speed: low 5-10 mph
Temp.: 75°F
Cloud Cover: med - heavy
Precipitation: drizzle for 10 minutes
Lake Conitions: ____

ANY OTHER CHARACTERISTICS OF NOTE: Numerous blue gill and L.M. bass observed in L shaped pond

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 2026.023 SD14

DATE 9/16/91

TIME 1400

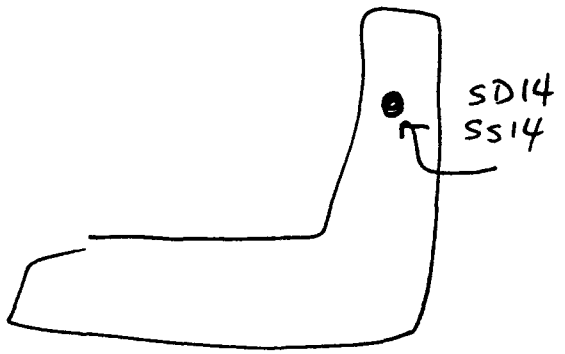
COLLECTOR Bill Schaefer
Anya Kirylkowicz

Sample No. SD14

Water Depth 9.1

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman dredge
S.S. Bowl, spoon



PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: Black fine silt material "muck" Collected as shown in figure above.

Weather: Wind Direction: West
Wind Speed: 15 mph
Temp.: 75°F

Cloud Cover: med-hvy.
Precipitation: none
Lake Conitions: windy/choppy

ANY OTHER CHARACTERISTICS OF NOTE: This sample was collected in an area approximately 20x20 in area where seaweed was not growing as could be seen from the boat. Black sediment exhibited small rainbow sheen circles when disturbed and dragged from bottom of pond. Petroleum smell was not noticed. Sheen may be naturally occurring

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 20026.023 SD15

DATE 9/17/91

TIME 0745

COLLECTOR Schaefer
Kirykowicz

Collected from center of small pond

Sample No. SD15

Water Depth 1.0 foot

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Hand Auger
Bowl spoon

PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: Black muck some gray/brown sand.

Weather: Wind Direction: None
Wind Speed: None
Temp.: 62°F

Cloud Cover: slight
Precipitation: None
Lake Conitions: Still

ANY OTHER CHARACTERISTICS OF NOTE: Duplicate sediment sample taken here.

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Hinco II Project No.: 20026.023 SD16

DATE 9/17/91

TIME 1125

COLLECTOR Schaefer
Kirykowicz

Sample No. SD16

Water Depth 26.5'

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman Dredge
Bowl Spoon

PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: black muck, silty - fine no sand observed no odor no visible sign of contamination

Weather: Wind Direction: West
Wind Speed: 5-10 mph
Temp.: 68°F

Cloud Cover: slight
Precipitation: none
Lake Conitions: slightly wavy

ANY OTHER CHARACTERISTICS OF NOTE: This sample ~~Ste~~ was collected as shown in Figure 4-4 of Phase II FSP in Quarry Pond

SHEET ____ OF ____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 20026.023 SD17

DATE 9/17/91

TIME 1258

COLLECTOR Schaefer
Kirykowicz

Sample No. SD17

Water Depth 25.2

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman Dredge
Bowl Spoon

PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: black/gray muck high water content, no odor, no visible sign of contamination

Weather: Wind Direction: West
Wind Speed: 5-10
Temp.: 70°F
Cloud Cover: Slight
Precipitation: None
Lake Conitions: ____

ANY OTHER CHARACTERISTICS OF NOTE: This sample collected from the location shown on Fig 4-4 of Phase II FSP

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Hmco II Project No.: 20026.023 SD18

DATE 9/17/91

TIME 1450

COLLECTOR Schaefer
Kirykowicz

Sample No. SD18

Water Depth 30.1'

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman dredge
Bowl spoon

PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: black/gray muck trace brown sand no odor no visible sign of contamination

Weather:
Wind Direction: West
Wind Speed: 5-10
Temp.: 70°F
Cloud Cover: slight
Precipitation: none
Lake Conitions: ____

ANY OTHER CHARACTERISTICS OF NOTE: This sample collected from the location shown on Figure 4-4 of Phase II FSP

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 20026 SD19

DATE 9/18/91

TIME 0920

COLLECTOR Schaefer
Koach

Sample No. SD19

Water Depth 9.1 feet

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman dredge
Bowl spoon

Wang House

Background Lake/Pond (SAND)

SD19, SS19

PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE: Black muck, twigs leaves, consistency of pudding no odor

Weather: Wind Direction: Northwest
Wind Speed: 15mph
Temp.: 58°F

Cloud Cover: Heavy
Precipitation: light rain
Lake Conitions: choppy

ANY OTHER CHARACTERISTICS OF NOTE:

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER**

Engineers & Architects & Scientists Site: Himco II Project No.: 20026 SD20

DATE 9/18/91

TIME 1040

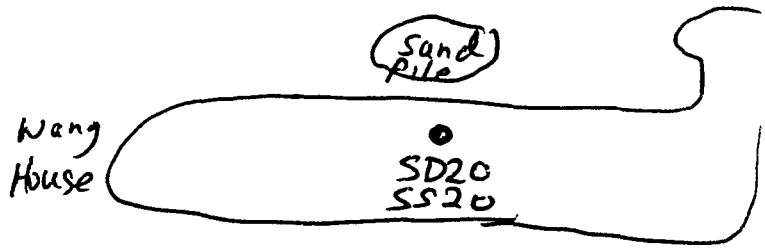
COLLECTOR Schaefer
Kirykowicz

Sample No. SD20

Water Depth 12.4 feet

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: EKman dredge
Bowl Spoon



PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE : Black/gray muck silty

Weather: Wind Direction: West
Wind Speed: 10 mph
Temp.: 58°F

Cloud Cover: heavy
Precipitation: none
Lake Conitions: ____

ANY OTHER CHARACTERISTICS OF NOTE: duplicate sample taken here

SHEET____ OF____

Donohue **SEDIMENT GRAB DATA FORM** **SAMPLE LOCATION NUMBER** SD21

Engineers & Architects & Scientists Site: Himco II Project No.: 20026

DATE 9/18/91

TIME 1225

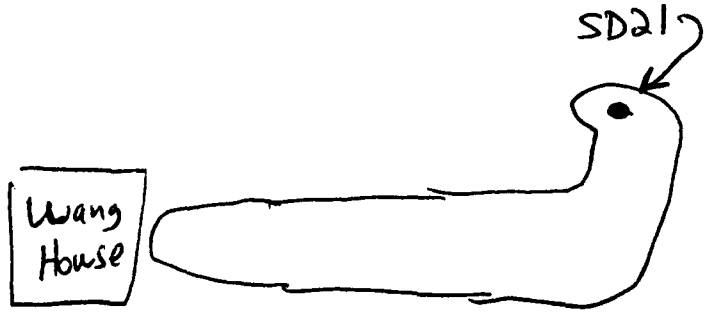
COLLECTOR Schaefer
Kirykowicz

Sample No. SD21

Water Depth 6.0 feet

Loran-C Coordinates: ____ Lat. ____ Long.

Sample Equipment: Ekman dredge
bowl spoon



PHYSICAL DESCRIPTION OF SEDIMENT GRAB SAMPLE : black/gray muck

Weather: Wind Direction: NW
Wind Speed: 5 mph
Temp.: 60°F

Cloud Cover: med
Precipitation: none
Lake Conitions: ____

ANY OTHER CHARACTERISTICS OF NOTE: ____

ORIGINAL

TECHNICAL MEMORANDUM NUMBER 24

DATE: October 8, 1991

TO: Vanessa Harris - Site Manager

CC: Roman Gau - Project Manager
Tom Dalton

FROM: Kim Elias

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

TEST PITS

Introduction

Thirteen test pits were excavated at the Himco Dump Site in Elkhart, Indiana, on September 10, through September 13, 1991. The purpose of the test pits were to delineate the extent of construction debris and collect leachate samples from select test pits designated in Section 4.14.3 of the Field Sampling Plan Addendum I (FSP), Himco Dump Remedial Investigation/Feasibility Study, Phase II, July 1991.

During the Phase I investigation completed in November-December 1990, contaminated groundwater (leachate) was observed draining from pockets of waste debris within the calcium sulfate and soil matrix. Seven trenches (test pits) (TL-1 through TL-7) were excavated for the collection of leachate samples and the delineation of construction debris. The leachate samples were analyzed to provide data to be used for assessing remedial alternatives and to provide data to the Publicly Operated Treatment Works (POTW) for pretreatment assessment.

In addition, six trenches (TD-1 through TD-6) were excavated to delineate the thickness and lateral extent of construction debris associated with high PNA values detected in soil samples taken during Phase I suspected wetland soil sampling.

All excavations were carried out in Level B personal protection. Excavations were dug by Chris Goodwin and Mike Donohue of John Mathes and Associates, Inc, with the use of a backhoe. Air monitoring of the excavation and leachate sampling was completed by Bill Schaefer (Donohue). Logging of the trenches and leachate sampling was completed by Kim Elias (Donohue). Perimeter monitoring downwind of the excavation was done by Anya Kirykowicz (Donohue). The purpose of this memo is to describe the test pit excavation methods, the leachate sample collection methods, and results as they relate to the Final Field Sampling Plan.

Methods

Test pit excavation locations were determined in the field by Bill Schaefer from previous trenching operations completed at the site (Phase I) and observations of surface debris. Excavation procedures are described in Section 4.14 of the Field Sampling Plan, Himco Dump Remedial Investigation Phase II, Elkhart, Indiana.

Once the locations of the test pits were determined, their locations were staked in the field by reference to the site survey grid stakes. After defining the work zone with caution tape and setting up the Level B equipment, the excavation was ready to begin. As the excavation proceeded, the Donohue geologist described the types of waste and soil being excavated by completing a trench log. Leachate descriptions for leachate samples collected were recorded on the leachate sampling form. Readings on air monitoring equipment were periodically recorded on an atmospheric monitoring log. Air monitoring was also performed continuously by a second person at the downwind side of the excavation outside of the work zone. Readings on an OVA, H_2S, $\%O_2$, LEL, and CO were all monitored.

Photographs were taken of any significant objects or staining. The bottom of the pit was defined by reaching the water table or leachate or the absence of construction debris or waste. The spoils were piled on the down-wind side of each trench. Upon completion of the pit, a measuring tape was used to define the depth of the excavation, the depths to any significant waste or soil horizons, and the dimensions of each pit. Following the completion of trench logs, and if applicable, the leachate sampling form, the excavation was immediately backfilled. All trench locations were staked with labeled wooden lath for surveying at a later date.

Samples of leachate were collected by re-excavating previous trench locations or by excavating at new locations. Once the trench was opened, the leachate was allowed to flow into the bottom of the trench from the trench walls. The samples were had collected by dipping a sample collection beaker into the leachate that had collected in the bottom of the trench. Samples for bromide were field filtered. Measurements of pH, conductivity, DO, and temperature were completed in the field.

The backhoe was decontaminated prior to trench activities and between test pit locations where leachate sampling was performed, as described in the Field Sampling Plan. Upon demobilization from the site, the backhoe was decontaminated by steam cleaning at the decontamination pad. Wastewater generated from steam cleaning was not containerized.

Deviations

Leachate samples were not collected from every leachate trench as specified in the Field Sampling Plan, due to lack of or insufficient leachate in trenches TL-3, TL-6, and TL-7. Trenches TL-3 and TL-7 were excavated to a depth of 19 feet and 15 feet, respectively, before cave-in occurred. This depth was considered sufficient for encountering leachate. No leachate was observed in

these trenches at their bottom depth and, therefore, no leachate samples were collected. Trench TL-6 was excavated to 14 feet. Some leachate was observed, however, it was insufficient for sample collection. The depths of trenches in which leachate was collected varied from 6 feet to 19 feet.

If sufficient leachate accumulated in the trench, the backhoe bucket was utilized to collect leachate samples instead of utilizing the sample dipper, as specified in the Field Sampling Plan. The backhoe bucket was more convenient and required less time than the sample dipper. This was completed by filling the backhoe bucket with leachate from the bottom of the trench, setting the bucket on the ground next to the trench, and filling the sample jars directly from the bucket. The sample dipper and rod was used for TL-5 when insufficient leachate was present in the trench to fill the backhoe bucket.

Summary of Results

Thirteen test pit locations were excavated. The test pit lengths varied. The widths were approximately 7 feet for each trench. The dimensions (in feet) are listed below, as well as the depth at which water or leachate was observed:

Trench	Depth	Length	Water/Leachate
TD-1	9	22	9
TD-2	4.5	20	4
TD-3	14	16	14
TD-4	11	15	11
TD-5	9	14	none
TD-6	4.5	16	none
TL-1	12	15	8
TL-2	8.5	13	4
TL-3	19	15	none
TL-4	6	14	5
TL-5	12	15	8
TL-6	14	15	none
TL-7	15	17	none

In general, the delineation trenches (TD-1 through TD-6) encountered rubble, black asphalt coated sand, or municipal waste. Leachate or water was encountered in four of the six delineation trenches, as noted above. The leachate trenches (TL-1 through TL-7) in general encountered rubble, municipal waste, white calcium sulfate, sludge, black asphalt coated sand, or fill sand. A few empty, unidentifiable drums were observed. Leachate or water was encountered in four of the seven trenches, as noted above.

Completed trench logs and leachate collection forms are attached. A summary of the information presented in these forms are found below. The logs can be referred to for specific details. The average or high atmospheric monitoring results from the OVA are also presented. No positive readings were produced on the lumidor or radiation detector.

Delineation Trenches

Trench TD-1

Trench TD-1 was excavated from northeast to southwest. The stratigraphic profile of Trench TD-1 began at the surface with approximately 1 foot of yellow-brown topsoil followed by 1 foot of gray-white friable calcium sulfate material. The white material was in a chunky powder form. A red plastic bag was observed.

Following the white layer, a brown to black sandy matrix with waste was recorded. The waste consisted of black material, plastic sheets or bags, a blue plastic bag, wood debris, municipal garbage, wires, rubber hose, a "Tide" bottle, and cardboard boxes. At approximately 6 feet, a black solid layer of sand with gravel was observed for 1 foot, followed by foam pads and a black viscous material with a sand matrix. This black material may consist of asphalt. At 8.5 feet, water or leachate began to bubble in. The black water filled the trench to 6.8 feet. The atmospheric readings near the trench from the OVA were sporadic. The average was 12 ppm for the breathing zone and the maximum was 100 ppm when the trench was excavated to 6 feet below the ground surface.

Trench TD-2

Trench TD-2 was excavated from east to west. The profile for Trench TD-2 began with a 6-inch layer of brown silty sand topsoil, followed by sand and gravel. Large concrete slabs (2 feet by 4 feet) were observed, followed by bricks, rubble, black sand and cobbles, wood debris and tree logs, cinder blocks, a beer can, rubber debris, plywood, and blue plastic bags. Water or black leachate was encountered at 4 feet and did not rise. Atmospheric monitoring readings from the OVA averaged 4 ppm until the water was encountered where it then detected sporadic 300 ppm readings in the breathing zone. This was the maximum reading at this trench.

Trench TD-3

Trench TD-3 was excavated from east to west. A yellow-brown topsoil was observed to a depth of 1 foot. White calcium sulfate was observed from 1 to 6 feet. This white friable powder material had occasional black soil mixed in. Some waste, bottles, and roots were observed in this layer. At approximately 6 feet to 7 feet, a black layer consisting of a sand matrix coated with asphalt or tar material was observed. It appeared to be sand with a bituminous or asphalt coating. This layer was mixed with the white material. At 8 feet, a gray sludge with white and black zones was observed to 14 feet. The base of the trench consisted of brown sandy silt with organic material, possibly the original ground surface.

Water or leachate was observed flowing from discrete areas at 14 feet. Atmospheric monitoring averaged 20 to 30 ppm from the OVA and a maximum of 100 ppm in the breathing zone.

Trench TD-4

Trench TD-4 was excavated from east to west. The stratigraphic profile began with brown sand topsoil for 6 inches and continued with debris in a sand matrix to 11 feet. The debris encountered consisted of glass, wood, bricks, plastic sheets, clear and brown glass bottles (pharmacy type), and wire. The debris content decreased and the amount of sand increased at 3 feet and again at 5 feet.

At approximately 11 feet, a gray, well-sorted sand was encountered. The sand was wet and water was observed in the bottom of the trench. No atmospheric readings above background were recorded during excavation of TD-4.

Trench TD-5

Trench TD-5 was excavated from east to west. The surface area was grassy and slightly hummocky. The profile of the trench began with 6 inches of dark brown topsoil and traces of brick and wood in sand from 6 inches to 2.5 feet. From 2.5 feet to 9 feet, a large amount of house construction debris was encountered within a minor sand matrix. The house debris included bricks, wood, construction debris, metal debris, wires, concrete, cinderblocks, plastic tubes, and a rusted radiator. At 9 feet, gray silty sand was encountered with no waste debris. No water was observed. No atmospheric readings above background were recorded.

Trench TD-6

Trench TD-6 was excavated from north to south. The stratigraphic profile began with brown silty sand topsoil with waste debris. The waste debris consisted of bricks, municipal garbage, glass, plastic, cans, and wood debris. At 1.5 feet below ground surface, dark brown to black sand with bricks, concrete, and rubber debris was observed to 3 feet. A black layer of bituminous or asphalt coated sand and gravel was observed next. Concrete slabs and a tire were observed near the bottom of the trench at 4.0 feet and the rubble appeared to decrease or end at the bottom of the trench (4.5 feet). A water pocket was observed at 4.0 feet. Atmospheric monitoring from the OVA measured an average of 10 ppm and a maximum of 60 ppm in the breathing zone.

Leachate Trenches

Trench TL-1

Trench TL-1 was located in a field of weeds, with relatively flat terrain. The excavation was from east to west. The stratigraphic profile consisted of 1 foot of topsoil followed by approximately 1 foot of unevenly layered white calcium sulfate powder-like material. Waste debris was observed beyond 2 feet. A flattened drum, concrete slabs, glass, metal sheeting, and a syringe were observed in a black, sandy matrix. Further down, rubber matting, insulation, black plastic bags of municipal garbage, and rolls of insulation were observed. Beyond 5 feet, a large amount of Alka-seltzer wrappers, glass, cardboard, and plastic was observed. An open and bent 55-gallon drum was observed. It appeared filled with debris and leachate.

Leachate poured into the pit at 8 feet, just above a layer of gray-white sludge material. The leachate was black, had a high viscosity, and an oil sheen. A leachate sample was collected from the backhoe bucket. Atmospheric monitoring averaged 100 ppm from the OVA in the breathing zone.

Trench TL-2

Trench TL-2 is located in a flat field of weeds and small brush and trees. The trench was excavated from east to west. The stratigraphic profile began with 1 foot of topsoil and roots followed by a 1-foot layer of white calcium sulfate material. Leachate began to seep in at several areas below the white layer. Black sandy soil and rubble was observed from 3 feet to 8 feet. The rubble consisted of bottles, plastic strips, bags, wood, and cardboard. Black leachate began to pour in around 4 feet. The amount of rubble decreased from 5 feet to 8 feet.

A leachate sample was collected with the backhoe bucket when sufficient leachate had filled the trench. The average atmospheric monitoring from the OVA was 100 ppm in the breathing zone. The maximum reading was 2,000 ppm from material in the bucket collected at 6 feet.

Trench TL-3

Trench TL-3 was excavated from east to west. The stratigraphic profile began with 1 foot of topsoil and continued with 1 foot of brown sand with numerous bricks. A layer of black, possibly asphalt coated sand, was observed from 2.5 to 4.5 feet. This graded into black-brown sand with cobbles and a bent 55-gallon drum. Moist gray sand was observed at 6 feet with some boulders, wood debris, and bricks to 8 feet. Gray-brown sand with no debris was observed from 8 feet to 19 feet. A trace of water was observed at 15 feet, but not sufficient to collect a leachate sample. The sand matrix caved in the trench at 16 feet. The trench had to be widened significantly in order to excavate any deeper. Atmospheric monitoring averaged 20 ppm on the OVA in the breathing zone and the maximum reading was 100 ppm.

Trench TL-4

Trench TL-4 was located in a field of weeds and small brush and surrounded by trees to the north and southwest. The trench was excavated from northwest to southeast. The stratigraphic profile began with topsoil and graded into sand with gravel, bricks, wood, metal pipes, and concrete slabs in a sand matrix to 6 feet.

Leachate seeped into the trench at one area 5 feet below ground and filled the trench to 4.5 feet. A leachate sample and duplicates were collected from the backhoe bucket. The leachate was black to dark brown, turbid, and contained organic matter. Atmospheric monitoring from the OVA detected an average of 10 ppm in the breathing zone and a maximum of 60 ppm from the headspace of a sample bottle of leachate.

Trench TL-5

Trench TL-5 was located in a grassy, hummocky field with scattered trees. The trench was excavated from east to west. The stratigraphic profile began with 1 foot of topsoil followed by rubble (wood sheeting, plastic debris, and a dented 55-gallon drum). Black sand, possibly coated with asphalt, was encountered from 3 feet to 5 feet. Water or leachate began to seep in the trench slowly at one area 4 feet below surface. Another dented 55-gallon drum was observed. At 5 feet, brown and black sand was observed which graded into gray-tan sand from 8 feet to 15 feet.

Dark red, thick leachate steadily seeped in the trench at one area at 6 feet below ground. It was thick, had an oil sheen, and an odor like model glue. The sampling rod and dipper was utilized to fill the sample jars and collect the leachate sample. The bucket could not be used because their was not sufficient leachate to fill it. The leachate contained little water and had a paint-like appearance. Field pH, conductivity, and temperature were not determined in order to avoid damaging the probes. Atmospheric monitoring detected an average of 30 ppm and a maximum of 100 ppm in the breathing zone.

Trench TL-6

Trench TL-6 was excavated from north to south. The stratigraphic profile began with brown silty sand topsoil and changed to rubble at 1.5 feet. The rubble consisted primarily of plastics, cardboard, and insulation in a sand matrix from 2 feet to 4 feet where the rubble ended. From 4 feet to 14 feet, tan or gray tan sand was observed with gravel. Water or leachate was seeping into the trench from two areas approximately 3 feet below surface, however, there was not sufficient leachate in the trench to collect a sample. The average atmospheric monitoring detected from the OVA was 70 ppm in the breathing zone.

Trench TL-7

Trench TL-7 was excavated from northwest to southeast. The stratigraphic profile began with 1 foot of topsoil and graded into mixed yellow-brown, gray, or reddish-brown sand to 3 feet. Then gray and light tan mixed sand was observed from 3 feet to 14 feet. This was considered fill because a plastic bag was observed at 7 feet. At 14 feet, gray sand was observed.

No water seeped into the trench. No leachate sample was collected. The trench was terminated at 15 feet because cave-in prevented further trenching. No atmospheric monitoring above background was detected from the OVA.

KE/bjz

A/O/M/DE8

TRENCH LOG FORM

[redacted]

CLIENT: U.S. EPA
PROJECT: Himco Dump
PROJECT NO.: 20026.023
DATE: 9/10/91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes; Mike Donohue
LOG BY: Kim Elias
TRENCH NO.: TD-1
TRENCH LENGTH: 9deep FT TO 22 FT
TRENCH WIDTH: 7

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 2 4 6 8 10 12 14 16 18 22	DRUM QUANTITY	REMARK NO.
		Top soil roots numerous 0-9"	0	
	1	0-1' yellow brown sand, poorly graded by product		
		White, hard powder like Lime/calcium Alka Seltzer		
		(red bag - plastic)		
		Brown layer of sand, black plastic bags blue bags		
	3	wood 1/2" x 6"		
		Garbage Bags wood		
	4	Black municipal waste, in sand (black) matrix,		
	5	wires, rubber hose, Tide bottle, cardboard boxes		
	6	Black, solid sand (sp), w/gravel m-lg,		
	7	foam pad Matrix of black, viscous material (stag)		
	8	(* bubbles) water flowing in		*
		8.5 ft water in black water to 9', filling hole to 6.8'		
	9			
	25			

REMARKS: Water, leachate, filling in hole, from 8.5 ft to 6.8 ft and rising when hole filled.
Bubbles of gas noted* Avg. OVA 12 ppm in BZ
max 100 ppm approx. 6' in depth

TRENCH LOG FORM

Donohue

CLIENT: U.S. EPA
PROJECT: Himco Dump, Phase II
PROJECT NO.: 20026.023
DATE: 9/10/91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes; Mike Donohue
LOG BY: Kim Elias
TRENCH NO.: TD-2
TRENCH LENGTH: 4.5 FT TO 20 FT
TRENCH WIDTH: 7

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 2	4	6	8	10	12	14	16	18	20	DRUM QUANTITY	REMARK NO.
		Top soil, brown silty sand, numerous roots 0-6"											
	1	Sand with gravel small to large / concrete slab 2' x 4' / concrete slab 2' x 3'											
	2	Bricks, rubbel, black sand					bricks, concrete						
		Brown sand matrix cobbles,					wood, wood logs						
	3	cinder block					Beer cans, rubber						
		plywood					blue bags						
	4	Wood, 1/2" x 6"					black sand?						
		(water at 4 ft)					black leachate						

REMARKS: Water at 4 ft - back, no bubbles and not rising
OVA readings averaged 4 ppm throughout excavation, 300 ppm in BZ when water reached

TRENCH LOG FORM

Donohue

CLIENT: U.S. EPA
PROJECT: Himco Dump Phase II
PROJECT NO.: 20026.023
DATE: 09-11-91
GRID COORD.: START - N____ E____ N____ E____
END - N____ E____ N____ E____
CONTROL MONUMENT GRID COORD.: N____ E____ N____ E____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes; Mike Donohue
LOG BY: K. Elias
TRENCH NO.: TD-3
TRENCH LENGTH: 16 FT TO 14 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 0	1	2	4	6	8	10	12	14	16	DRUM QUANTITY	REMARK NO.
		yellow brown sand (SP) topsoil					0-6" roots					0	
	1	(trace white calcium)											
		trace black soil											
	2	white calcium/lime powder, or					fine material w/ trace black soil						
		bottles					white powder, hard						
	3	~~black soil~~											
		roots,											
	4	mottled white w/ trace					black,						
	6	black, asphalt like material					sand matric - moist.						
		tar like - but not viscus											
	8	mottled white and black,					asphalt like sand base						
		moist, - sludge gray					not solid or hard but						
	10						soft-medium samd (SP)						
		mottled white & black											
	12												
	14	water/leachate, pared in - spotty areas											
		14.5 brown organic base, siltry w/ trace sand - ok											
	25												

REMARKS:

Black asphalt or tar material has sand matrix with bituminous mixture
Water near base 14 ft, spotty & pouring in - slowly. Top soil placed on top of back filled trench
Brown organic material at base = 14.5' - neutral material. The rest was fill.
No debris.

OVA avg. 20-30 ppm in BZ 100ppm max. in BZ.

TRENCH LOG FORM

Donahue

CLIENT: U.S. EPA
PROJECT: Himco Dump , Phase II
PROJECT NO.: 20026.026
DATE: 09-11-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes;C.G.
LOG BY: K. Elias
TRENCH NO.: TD-4
TRENCH LENGTH: 15 FT TO 11 FT deep
TRENCH WIDTH:

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 1 2 3 4 5 6 7 8 9 0	DRUM QUANTITY	REMARK NO.
		brown sand dry/ glass bottles;100ml/ wood	0	
	1	debris wood /filled white		
		bricks plastic sheets, (pharmacy) Bottles, glass clear & brown		
	2			
		wood 6"xl/2" plastic sheets, numerous bricks, wires		
	3			
		sand, content increasaing, occasional debris		
	4			
	5			
	6	sand, brown (SP) fill trace of		
	7	glass, bricks, wood, plastic sheets		
	8			
	9			
	10			
	11	Wet, gray sand - fine to coarse (SW)		

REMARKS:

Water @ 11 ft. Debris 6" to 5 ft. heavy & sand increase beyond 5 ft.
No ova readings at any time.

TRENCH LOG FORM

Donohue

CLIENT: U.S. EPA
PROJECT: Himco Dump, Phase II
PROJECT NO.: 20026.023
DATE: 09-11-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TD-5
TRENCH LENGTH: 14 FT TO 9 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 1 2 4 6 8 10 12 13 14	DRUM QUANTITY	REMARK NO.
		Dark brown siltry sand, 0-6" topsoil		
	1	trace brick trace wood		
		sand		
	2	metal wire		
		bricks - numerous wood debris, construction debris		
	3	minor sand, bricks wires		
		concrete, bricks wood plastic tubes, under block		
	4			
		wood, dry, little sand matric radiator		
	5			
	6			
	7			
	8			
	9	end of wood & bricks - gray sandy silt		

REMARKS:
house debris, no water noted
no ova readings at any time during this excavation

TRENCH LOG FORM

Donohue

CLIENT: U.S. EPA
PROJECT: Himco Dump, Phase II
PROJECT NO.: 20026.023
DATE: 09-11-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes; M. Donohue
LOG BY: K. Elias
TRENCH NO.: TD6
TRENCH LENGTH: 16 FT TO 4.5 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT)	DRUM QUANTITY	REMARK NO.
		2 4 6 8 10 12 14 16		
		brown silty sand w/ garbage: glass, plastic, cans, wood, debris, 0-1.5		
	1	brick		
		1.5 sal., dark brown - black, bricks sand		
	2	concrete wood log concrete trace asphalt		
		rubber flipper trace asphalt blade bituminous sand and gravel		
	4	sand- concrete 4'x3'x3'		
		trace asphalt concrete 4'x3' tire (water pocket)		
	20			
	25			

REMARKS:

pocket of water @ 4' rubbel appeared to decrease or end @ 4.5"
Avg. 10 ppm in BZ, Max of 60ppm in BZ

TRENCH LOG FORM

Donahue

CLIENT: U.S. EPA
PROJECT: Himco Dump
PROJECT NO.: 20026.023
DATE: 09-13-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTHOL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes;C. Goodwin
LOG BY: K. Elias
TRENCH NO.: TL-1
TRENCH LENGTH: 1.5 FT TO 12 FT
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 1 2 3 4 5 6 7 8 9 0	DRUM QUANTITY	REMARK NO.
		0-1ft topsoil, dark brown silty sand, trace gravel		
	1	root/ets, noist, organic	1	
		mottled, unevenly layered white calcium carbonate cl ft	OVA	
	2	debris: drum=flattened, concrete, glass, metal sheeting	=20	
		black material - silty sand matrix syrigens, wood	PPM	
	3	rubber matting, insulation - stained black		
		~~(leachate seeping in) Debris = 80%~~		
	4	black bags of municipal garbage, rolls of insulation		
	5	alkaselser wrapper, glass carboard, plastic		
	6			
		DRUM bent, opened		
	7	white filled w/ debris		
		leachate - black pouring in leachate		
	8	at 8 ft. above the gray/white sludge material		
		layer of =		
	10			
	12			
	25			

REMARKS:

Level B trenching - see photos. Leachate was black, thick, oil sheen
OVA averaged 100ppm

TRENCH LOG FORM

[redacted]

CLIENT: U.S. EPA
PROJECT: Himco Dump
PROJECT NO.: 20026.023
DATE: 09-13-91
GRID COORD.: START - N____ E____ N____ E____
END - N____ E____ N____ E____
CONTROL MONUMENT GRID COORD.: N____ E____ N____ E____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TL-2
TRENCH LENGTH: 1.3 FT TO 8.5 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT)	DRUM QUANTITY	REMARK NO.
		silty sand rop soil 0 - 1ft., roots gravel	PPM	
	1		OVA	
		plastic by products 1' thick laues - pushed out		
	2	white line/ calcium carbonate - powder like, hard	30ppm	
		water pouring in at spots @ 2.5 ft & 3ft		
	3	black soil rubbel: bottles, plastic strips, bags, wood		
		cardboards	60ppm	
	4	waterfill to 4ft., black water, let fill trench pre sampling		
	5	black soil: w/ rubbel, wet, rubbel 45% of trench		
			200ppm	
	6	logs		bucket
	7			
	8			
	20			
	25			

REMARKS: Level B. Trench, leachate collection. mills sampling also
OVA Average ~100ppm in BZ
Water filled in from several seap areas int he trench

TRENCH LOG FORM

[redacted]

CLIENT: U.S. EPA
PROJECT: Himco Dump/Phase II
PROJECT NO.: 20026.023
DATE: 09-12-91
GRID COORD.: START - N____ E____ N____ E____
END - N____ E____ N____ E____
CONTROL MONUMENT GRID COORD.: N____ E____ N____ E____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TL-3
TRENCH LENGTH: 15 FT TO 19 FT deep
TRENCH WIDTH: 8'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT)	DRUM QUANTITY	REMARK NO.
		Brown moist. sand with trace silt, roots, topsoil		
	1			
		(SP) fill		
	2	sand, brown, fix - medium , bricks numerous		
		black soil or asphalt and sand mixture		
	3			
		blue/black material - sand mixture w/ gravel		
	4	may have asphalt or petroleum or bituminous mixture in sand		
		mutted, black/brown sand moist.		
	5	metal, drum flattened cobbles, heulters		
	6	moist/wet gray sand (SW) fine - coarse		
	7	builders /wood 1/2' x 6' / logs / bricks/ w/ blk sd.		
	8			*
	9	gray brown sand, moist., trace gravel		**
	10			
	11	no debris		
	12			
	13			
	14			
	15	trace water infiltrating in @15ft (caning in, therefore widen trench)		

REMARKS: * 8ft 20 ppm on OVA - Breathing zone, ** = 100ppm on OVA Breathing zone
collected soil samples @ 2ft & 6ft intervals
bottom at 19ft, could not go deeper, would cave back in & up to 16ft

Leachate sample not collected due to cave in

TRENCH LOG FORM

Donahue

CLIENT: U.S. EPA
PROJECT: Himco Dump/Phase II
PROJECT NO.: 20026.023
DATE: 09-12-91
GRID COORD.: START - N____ E____ N____ E____
END - N____ E____ N____ E____
CONTROL MONUMENT GRID COORD.: N____ E____ N____ E____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TL-4
TRENCH LENGTH: 14 FT TO 6 FT deep
TRENCH WIDTH: 6'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 1 2 3 4 5 8 9 10 12 14	DRUM QUANTITY	REMARK NO.
		black brown organic topsoil, silty sand w/ numerous rootlets		
	1			
		sand w/ silt & gravel sark brown/black, numerous bricks, wood		
	2	bricks, wood, metal pipes, debris		5ppm
		concrete slab		
	3	in sand matrix		
	4			
	5	water pouring in @ 5ft, - filled to 4.5		10ppm
		bottom hole 6ft		
	15			
	20			
	25			

REMARKS:

Collected leachate samples & duplicates. Level B protection
Note: water flowed into trench at one spot (6"x4"). The flow was steady till 4.5 ft.

OVA averaged 5-10ppm in BZ.

TRENCH LOG FORM

Donahue

CLIENT: U.S. EPA
PROJECT: Himco Dump
PROJECT NO.: 20026.023
DATE: 09-13-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TL-5
TRENCH LENGTH: 15 FT TO 12 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT)	DRUM QUANTITY	REMARK NO.
		brown silty topsoil, roots, gravel tree	WA	
	1			
		rubbel · bent drum empty	30ppm	
	2	wood sheetings, plastic debris	=AVG	
		DRUM		
	3	black, black material, asphalt mixture w/ sand base layer	max=	
		stay like	100ppm	
	4	water seeping in slowly at one spot smashed DRUM		
	5	sandy - brown & black		
	6	leachate filling in - red/brown thick		
	8	water/leachate sand - tan		
	10			
	12	GRAY TAN SD		
	25			

REMARKS: Leachate collected in level B. Thick red brown (product) leachate, oil sheen, shina.

TRENCH LOG FORM

Donahue

CLIENT: U.S. EPA
PROJECT: Himco Dump
PROJECT NO.: 20026.023
DATE: 09-13-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes
LOG BY: K. Elias
TRENCH NO.: TR-6
TRENCH LENGTH: 15 FT TO 14 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT)	DRUM QUANTITY	REMARK NO.
		brown silty sand, trace gravel, roots, moist./topsoil	OVA	
	1		20	
		rubbel; black, plastics, cardboards, insulation, sand matrix, black		
	2		B.2.	
		black, plastics, sheets, 1/2" thick, rubbel 80% (water packet)	70ppm	
	3	rubbel		
	4	tan sand		
	5	gray tan sand (SP) f - medium, trace coarse		
		trace gravel		
	6			
	7			
	8			
	10			
	12			
	14			
	25			

REMARKS:

No leachate collected, Rubbel 2-4ft., leachate was seeping in at two areas, slowly. Notsufficient to collect a sample
* 70ppm in breathing zone 15ft. from trench

TRENCH LOG FORM

Donohue

CLIENT: U.S. EPA
PROJECT: Himco Dump , Phase II
PROJECT NO.: 20026-023
DATE: 09-13-91
GRID COORD.: START - N_____ E_____ N_____ E_____
END - N_____ E_____ N_____ E_____
CONTROL MONUMENT GRID COORD.: N_____ E_____ N_____ E_____
ELEVATION, TOP OF TRENCH:

SHEET 1 OF 1
EXCAVATOR: Mathes;C.G.
LOG BY: K. Elias
TRENCH NO.: TL-7
TRENCH LENGTH: 17 FT TO 15 FT deep
TRENCH WIDTH: 7'

STRATA CHANGE OF WATER LEVEL	DEPTH	TRENCH LENGTH (FT) 2 4 6 7 8 9 10 12 15 17	DRUM QUANTITY	REMARK NO.
		(SP) silty sand, brown, damp, roots	0	
	1	(glass bottle)		
		mottled yellow brown (gray sand) reddish brown		
	2			
	3	gray sand, mottled		
	4	light tans sand, f - m fill		
	5			
	6			
	7	plastic bag-black		
	8			
	9			
	10			
	12			
	14	gray, well graded sand		
	15			

REMARKS:

No water in hole, 15ft. deep, sand caved in : 1:1 grade
No leachate sample located

Donohue ENGINEERS ARCHITECTS SCIENTISTS

LEACHATE COLLECTION FORM

SAMPLE LOCATION NUMBER: TL-1

Site Himco Dump Project Phase II RI

Collectors Yim Elias

Date 9/13/91

Location Description Field of weeds, flat on top of fill

Collection Device Backhoe Bucket

Collection Method Backhoe bucket filled with leachate. & we filled bottles with pyrex container

PHYSICAL DESCRIPTION OF LEACHATE SAMPLE: water leachate: black, turbid, odor, silty, floating wood & debris

ANY OTHER CHARACTERISTICS OF NOTE: approx 8 ppm from leachate in bucket, (OVA) 0ppm from leachate with HNu

pH 7.41

Cond 3.6 mV

Temp 18.0 °C

DO 0.3 mg/L

Donohue ENGINEERS ARCHITECTS SCIENTISTS

LEACHATE COLLECTION FORM

SAMPLE LOCATION NUMBER: TL-2

Site Hinco Dump Project Phase II RI

Collectors Kim Elias / Bill Schaefer
Date 9/13/91
Location Description field of weeds & small brush + small trees

Collection Device Backhoe bucket
Collection Method
Backhoe bucket up with leachate from trench filled jars

PHYSICAL DESCRIPTION OF LEACHATE SAMPLE: Water: Black/gray odor, silty, turbid, organics in leachate

ANY OTHER CHARACTERISTICS OF NOTE: Level B, avg = 60ppm in breathing zone & 1000 ppm up close in trench

8 ppm from surface of leachate ~~in steam zone~~

pH 8.3
temp 17°C
cond 50 mV
DO 0.5 mg/L

Donohue ENGINEERS ARCHITECTS SCIENTISTS

LEACHATE COLLECTION FORM

SAMPLE LOCATION NUMBER: TL-4

Site: Himco Dump Project: Phase II/RI

Collectors: Kim Elias / Bill Schaefer

Date: 9/12/91

Location Description: TL-7 trench, field of weeds & small brush, surranded by trees to N, S & W

Collection Device: Backhoe bucket

Collection Method: Backhoe filled with water, & up to surface. Filled bottles from backhoe bucket

PHYSICAL DESCRIPTION OF LEACHATE SAMPLE: Water with sediment and organic matter. Black to dark brown water. Turbid. OVA = 10 ppm in Breathing Zone, (MAX) 60 ppm from bottled head space

4 ppm on OVA from surface of leachate in bucket

ANY OTHER CHARACTERISTICS OF NOTE:

pH = 6.66 units

cond. = 54.0 mV, 2.04 mS 688 µS

temp = 22 °C

Donohue ENGINEERS ARCHITECTS SCIENTISTS

LEACHATE COLLECTION FORM

SAMPLE LOCATION NUMBER: TL-5

Site TI-5 Project HiMco Dump

Collectors K. Elias B. Schaefer

Date 9/13/91

Location Description hummocky, Grassy & trees scattered

Collection Device Dipper,

Collection Method Fill Dipper, Fill jars

PHYSICAL DESCRIPTION OF LEACHATE SAMPLE: Red/brown - thick, sheen, discolors oil texture, product, shiny. ODOR, turbid, NASTY -

odor of 1,1,1 trichloroethane ?
described as model glue smelling

This location may be a drum burial site

ANY OTHER CHARACTERISTICS OF NOTE: Level B

OVA readings of 10 ppm at surface of sample in polyethylene dipper

pH cond. temp not taken to avoid damaging probes

ORIGINAL

TECHNICAL MEMORANDUM - NO. 25

DATE: November 1, 1991

TO: Vanessa Harris, Site Manager

CC: Mansour Ghiasi, RI Lead
Roman Gau, Project Manager
Mike Crosser, TSQAM

FROM: Anya Kirykowicz

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Himco Dump RI/FS
Donohue Project No. 20026.024

WETLANDS DELINEATION

Introduction

On October 15, 1991, Donohue & Associates, Inc., conducted an on-site wetlands delineation at the Himco Dump Superfund site as part of the RI Phase II Work Plan. The delineation was conducted by Anya Kirykowicz and Tracey Koach. One area of the site was identified as a wetland during the Phase I activities. As shown on Figure 1, this area is located south of the gravel pit.

Methods

As outlined in Section 4.2.4.3 of Addendum I, Phase II Work Plan, Himco Dump RI/FS Elkhart, Indiana, three essential characteristics were used to delineate the wetland area. These characteristics are: hydric soils, wetland hydrology, and hydrophytic vegetation. These characteristics and their technical criteria are described below. The boundaries between wetland and upland areas were identified using methods accepted by the United States Army Corps of Engineers (USCE).

On August 14, 1991, the Environmental Protection Agency published proposed revisions to the 1989 Manual. The Corps of Engineers was mandated by Congress to return to the use of the following manual: Environmental Laboratory, 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. Due to the similarity between the 1989 Manual and the 1987 Manual, the field team used the 1989 Manual. Attached is a sample letter the USCE has issued to permit applicators. Delineations made during the revision approval period may be subject to redelineation.

The Routine On-Site Wetland Determination Method from the 1989 Manual was used. Sampling tube cores were used to examine the soil profile for hydric soils and wetland hydrology. An assessment of hydrophytic vegetation was made at each sampling tube core. The following equipment was used: soil sampling tube, dead blow hammer, site map, field notebook, Munsell Soil Color Charts, flagging tape, wooden lathe, camera, plastic bags, field guides for plant identification, USGS topographic map, Hydric Soils of the United States List, and an aerial photograph.

Deviations

There were no deviation of methods.

Wetland Hydrology

Wetland hydrology is defined as permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. The wetland hydrology criterion is met if a site is inundated or saturated to within 1.5 feet below the surface, based on the soil drainage characteristics, for at least one consecutive week during the growing season in an average rainfall year (Federal Interagency Committee for Wetland Delineation, 1989). This criterion is the least exact and the most difficult to assess in the field.

Hydric Soil

Hydric soils are defined as soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part (U.S.D.A. Soil Conservation Service, 1987). An area has hydric soils when the National Technical Committee for Hydric Soils criteria are met. These criteria relate to soil types, soil drainage characteristics, water table levels and frequency of flooding or ponding.

Hydrophytic Vegetation

Hydrophytic, or wetland vegetation is defined as macrophytic plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Federal Interagency Committee for Wetland Delineation, 1989). The U.S. Fish and Wildlife Service publishes a list of plant species that occur in wetlands by region. Each species in the list is given an indicator status reflecting the range of estimated probability that it may occur in a wetland versus non-wetland area across its entire distribution. These indicator categories are listed below:

- Obligate Wetland (OBL). Occur almost always (estimated probability >99%) under natural conditions in wetlands.
- Facultative Wetland (FACW). Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
- Facultative (FAC). Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
- Facultative Upland (FACU). Usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability (1%-33%).
- Obligate Upland (UPL). Occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in non-wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the National List.

The hydrophytic vegetation criterion for wetland identification is met when more than 50 percent of the dominant species at a given site are obligate, facultative wetland or facultative species.

Summary of Results

Thirteen sampling tube cores were used to examine the soil profile for hydric soils and wetland hydrology. The vegetation at these 13 locations was also identified. The wetland boundary is shown on Figure 1. The wetland is less than one-half acre in size. Hydrophytic vegetation in the wetland was dominated by Typha angustifolia (Narrow-leaf Cattail-OBL) and Salix sp (Willow sp.)

AK:ds

A/R/HIMCO/AH5

TECHNICAL MEMORANDUM NUMBER 26

ORIGINAL

DATE: December 30, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau, Project Manager
Tom Dalton
PMO Files

FROM: Steve Padovani

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump Phase II

Slug Testing Field Procedures and Analysis - WT111A

Introduction

Monitoring well WT111A was slug-tested by Steve Padovani and Bill Schaefer at the Himco Dump on November 19, 1991. Well WT111A was installed by Donohue as part of the Phase II remedial investigation in September 1991. WT111A was slug-tested to determine the hydraulic conductivity of the outwash deposits at that point.

Field Methods

An ORS Environmental Equipment Model EL-200 data logger and pressure transducer were used to collect slug test data. The battery-operated unit translates water pressure into electrical signals within the transducer. The electrical signals are relayed by a cable to the data logger where they are converted and displayed as water level data. The time and water level data are recorded during the test and stored in the data logger memory until the data is sent to a disk or printer for later analysis.

Slug tests were performed as described in Section 4.15.3 of the Final Field Sampling Plan, Addendum I, Himco Dump Remedial Investigation/Feasibility Study, Elkhart, Indiana. The setup for the slug test began by unlocking the protective casing and using a decontaminated electric water level indicator to measure the static water level and the depth to well bottom. This data was recorded on In-Field Hydraulic Conductivity Slug Test Forms (Appendix B). A 5 psi transducer was decontaminated with soap and tap water, and a tap water rinse before lowering into the well. The mode which allows the water level to be read on the data logger display was activated so that the depth of water above the transducer could be read while the transducer was lowered into the water. The transducer cable was duct taped to the protective casing when approximately 9 feet of water was above the level of the transducer. A 4-foot long stainless steel slug was slowly lowered down the well until a slight perturbation in static water level was noticed on the data logger LCD display, indicating the slug had intersected the water table. The slug was raised a few

inches above the water surface as the water level was allowed to equilibrate. After the water level had equilibrated, the data recording mode of the logger was activated simultaneously with lowering the slug 4 to 5 feet into the water. The falling water level and time were recorded in the data logger memory. When the static water level was re-established, the falling head test was ended. A record of the rising water level and time was also obtained as the slug was removed from the water (rising head test). The test was complete when the static water level was reached.

Analysis Evaluation

Slug test data were analyzed using the method of Bouwer and Rice (1976), through the use of a PC-based computer program developed by Donohue & Associates, Inc. The assumptions of the method are that 1) the drawdown of the water table around the well is negligible, 2) flow above the water table (capillary fringe) can be ignored, 3) well losses are negligible, and 4) the aquifer is homogeneous and isotropic.

Selection of the segment of the data plot of the natural logarithm of drawdown versus time to be used for the calculation of hydraulic conductivity was based upon the following criteria as described in Bouwer and Rice (1976):

- The straight line portion of the plot of recovery versus time is the valid data to be used in the analysis. An evaluation of the fit of the data to a straight line was accomplished by linear regression analysis included in the program. The regression values indicated a strong linear relationship in the data. This implies that the assumptions of the analysis method are being met.

- The hydraulic conductivity of the aquifer was significantly different (several orders of magnitude) from the hydraulic conductivity of the sand pack. Therefore, sand pack dewatering was accounted for in the analysis.

Both rising and falling head tests provided valid data. However, rising head tests are preferred in water table wells since falling heat tests may give a higher value due to draining into the vadose zone (Bouwer, 1989).

WT111A hydraulic conductivities were 2.58×10^{-3} cm/sec for falling head and 7.75×10^{-3} cm/sec for rising head, with an average value of 5.17×10^{-3} cm/sec. These values fall within hydraulic conductivity values given for silty sand, clean sand, and gravel (Freeze and Cherry, 1979). These values are consistent with the visual descriptions and grain size analysis given on the boring logs.

Printouts of the data and data plots of drawdown versus time are included in Appendix A.

Deviations

The slug test on WT111A was originally scheduled to occur in September 1991. Due to equipment malfunctions, the slug test was not completed until November 19, 1991.

References

Bouwer, H., 1989, The Bouwer and Rice Slug Test - An Update, v. 27, n. 3, pp. 304-309.

Bouwer, H., and Rice, R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, v. 12, n. 3, pp. 423-428, 1976.

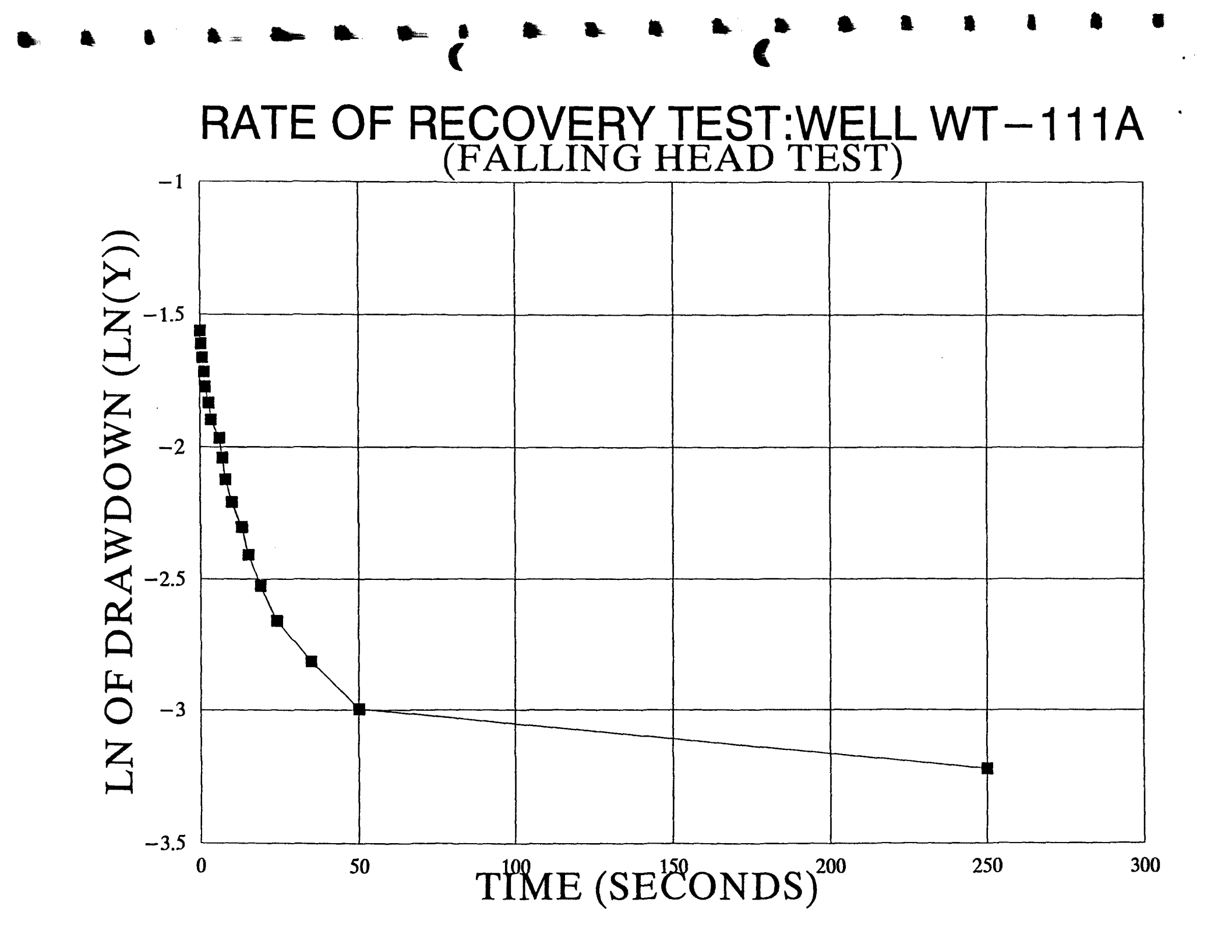
Freeze, R.A., and Cherry, J.A., 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, pp. 29.

SP:llw

A/R/HIMCO/AI3

APPENDIX A

DATA PLOTS AND ANALYSIS


RATE OF RECOVERY TEST:WELL WT-111A
(FALLING HEAD TEST)
LN OF DRAWDOWN (LN(Y))
-1
-1.5
-2
-2.5
-3
-3.5
0
50
100
150
200
250
300
TIME (SECONDS)

BOUWER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY CONFINED AQUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "*".
PROGRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

#	*TIME sec (X)	*DEPTH TO WATER Ft.	DRAWDOWN (Y)	TIME sec (X')	LN (Y)
1		6.35	0.210	0.00E+00	−1.5606
2		6.34	0.200	2.00E−01	−1.6094
3		6.33	0.190	6.00E−01	−1.6607
4		6.32	0.180	1.20E+00	−1.7148
5		6.31	0.170	1.60E+00	−1.7720
6		6.30	0.160	2.80E+00	−1.8326
7		6.29	0.150	3.40E+00	−1.8971
8		6.28	0.140	6.00E+00	−1.9661
9		6.27	0.130	7.00E+00	−2.0402
10		6.26	0.120	8.00E+00	−2.1203
11		6.25	0.110	1.00E+01	−2.2073
12		6.24	0.100	1.30E+01	−2.3026
13		6.23	0.090	1.50E+01	−2.4079
14		6.22	0.080	1.90E+01	−2.5257
15		6.21	0.070	2.40E+01	−2.6593
16		6.20	0.060	3.50E+01	−2.8134
17		6.19	0.050	5.00E+01	−2.9957
18		6.18	0.040	2.50E+02	−3.2189
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					

*PROJECT NAME : HIMCO
*PROJECT NO : 20026.024
*WELL NO : WT111A−FALL
*ANALYST : PADOVANI
*DATE COLLECTED : 19−Nov−91
*RISER PIPE (ID): (d (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
*EFFECTIVE SCREEN DIAAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
*EFFECTIVE SCREEN LENGTH: (L) = 8.52 Ft.
*MAX DRAWDOWN (IN SUBSET): (Ymax) = −0.19 Ft.
*STATIC WATER LEVEL: (SWL) = 6.14 Ft.
*DEPTH FROM SWL TO EFF. SCREEN BOTTOM: (H) = 8.52 Ft.
*EST. AQUIFER DEPTH (SWL TO AQUIFER BOTTOM): (D) = 175.00 Ft.
*INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)? 0
*SANDPACK'S SPECIFIC YIELD (Sy) = 0.10

BOUWER AND RICE CURVE COEFFICIENTS:
RATIO OF L/(r sub w) = 25.56
---LOG OF L/(r sub w) = 1.4076
FOR PARTIALLY PENETRATING WELLS--
A = 2.28
B = 0.32
FOR FULLY PENETRATING WELLS--
C = 1.69

---EVALUATION OF LN(Re/(r sub w)):
CONST.1 = 0.3394
CONST.2 = 6.2135 =(MAX. OF 6.0)= 6.0000
LN(Re/(r sub w) = 1.99

EFFECTIVE r sub c (for sandpack dewatering) = 0.0833
(1/T)(LN(Yo/Yt)) (SLOPE) = −5.55E−02 sec^(−1)

HYDRAULIC CONDUCTIVITY (K) = 4.50E−05 ft/sec <==========
1.37E−03 cm/sec <==========

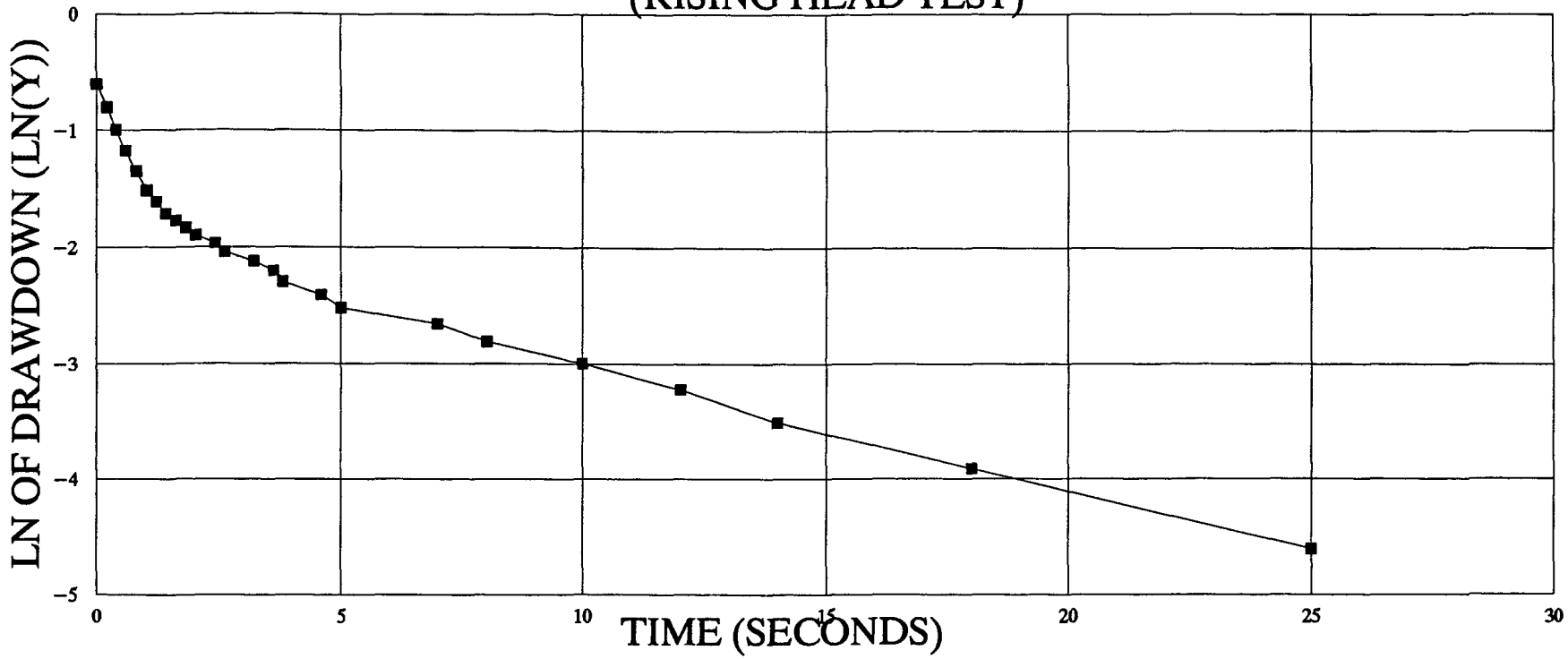
Regression Output:

Constant		−1.64E+00
Std Err of Y Est		0.0461
R Squared		0.9668
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	−5.55E−02	
Std Err of Coef.	0.0033	

T=0,13

RATE OF RECOVERY TEST:WELL WT-111A

(RISING HEAD TEST)



BOUWER AND RICE METHOD FOR INTERPRETATION OF SLUG TESTS: FOR UNCONFINED AND LEAKY CONFINED AQUIFERS.
TO UTILIZE THIS WORKSHEET, ENTER YOUR DATA AT LOCATIONS MARKED BY AN "*".
PROGRAM CAN INCLUDE EFFECTS OF SANDPACK DEWATERING (ASSUMING WATER IS RISING WITHIN THE SANDPACK).

#	*TIME sec (X)	*DEPTH TO WATER Ft.	DRAWDOWN (Y)	TIME sec (X')	LN (Y)
1		5.59	0.550	0.00E+00	−0.5978
2		5.69	0.450	2.00E−01	−0.7985
3		5.77	0.370	4.00E−01	−0.9943
4		5.83	0.310	6.00E−01	−1.1712
5		5.88	0.260	8.00E−01	−1.3471
6		5.92	0.220	1.00E+00	−1.5141
7		5.94	0.200	1.20E+00	−1.6094
8		5.96	0.180	1.40E+00	−1.7148
9		5.97	0.170	1.60E+00	−1.7720
10		5.98	0.160	1.80E+00	−1.8326
11		5.99	0.150	2.00E+00	−1.8971
12		6.00	0.140	2.40E+00	−1.9661
13		6.01	0.130	2.60E+00	−2.0402
14		6.02	0.120	3.20E+00	−2.1203
15		6.03	0.110	3.60E+00	−2.2073
16		6.04	0.100	3.80E+00	−2.3026
17		6.05	0.090	4.60E+00	−2.4079
18		6.06	0.080	5.00E+00	−2.5257
19		6.07	0.070	7.00E+00	−2.6593
20		6.08	0.060	8.00E+00	−2.8134
21		6.09	0.050	1.00E+01	−2.9957
22		6.10	0.040	1.20E+01	−3.2189
23		6.11	0.030	1.40E+01	−3.5066
24		6.12	0.020	1.80E+01	−3.9120
25		6.13	0.010	2.50E+01	−4.6052
26		6.14	0.000	4.00E+01	ERR
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					

*PROJECT NAME : HIMCO
*PROJECT NO : 20026.024
*WELL NO : WT111A−RISE
*ANALYST : PADOVANI
*DATE COLLECTED : 19−Nov−91
*RISER PIPE (ID): (d (2 r sub c) = 2.0 in. = 0.0833 (radius in ft.)
*EFFECTIVE SCREEN DIAAMETER:(2 r sub w) = 8.0 in. = 0.3333 (radius in ft.)
*EFFECTIVE SCREEN LENGTH: (L) = 8.52 Ft.
*MAX DRAWDOWN (IN SUBSET): (Ymax) = 0.22 Ft.
*STATIC WATER LEVEL: (SWL) = 6.14 Ft.
*DEPTH FROM SWL TO EFF. SCREEN BOTTOM: (H) = 8.52 Ft.
*EST. AQUIFER DEPTH (SWL TO AQUIFER BOTTOM): (D) = 175.00 Ft.
*INCLUDE SANDPACK DEWATERING (ENTER 1 IF YES, 0 IF NO)? 1
*SANDPACK'S SPECIFIC YIELD (Sy) = 0.10

BOUWER AND RICE CURVE COEFFICIENTS:
RATIO OF L/(r sub w) = 25.56
---LOG OF L/(r sub w) = 1.4076
FOR PARTIALLY PENETRATING WELLS--
A = 2.28
B = 0.32
FOR FULLY PENETRATING WELLS--
C = 1.69

---EVALUATION OF LN(Re/(r sub w)):
CONST.1 = 0.3394
CONST.2 = 6.2135 =(MAX. OF 6.0)= 6.0000
LN(Re/(r sub w) = 1.99

EFFECTIVE r sub c (for sandpack dewatering) = 0.1318
(1/T)(LN(Yo/Yt)) (SLOPE) = −1.26E−01 sec^(−1)

HYDRAULIC CONDUCTIVITY (K) = 2.54E−04 ft/sec <==========
7.75E−03 cm/sec <==========

t = 1, 25

Regression Output:

Constant		−1.68E+00
Std Err of Y Est		0.1403
R Squared		0.9724
No. of Observations		20
Degrees of Freedom		18
X Coefficient(s)	−1.26E−01	
Std Err of Coef.	0.0050	

APPENDIX B

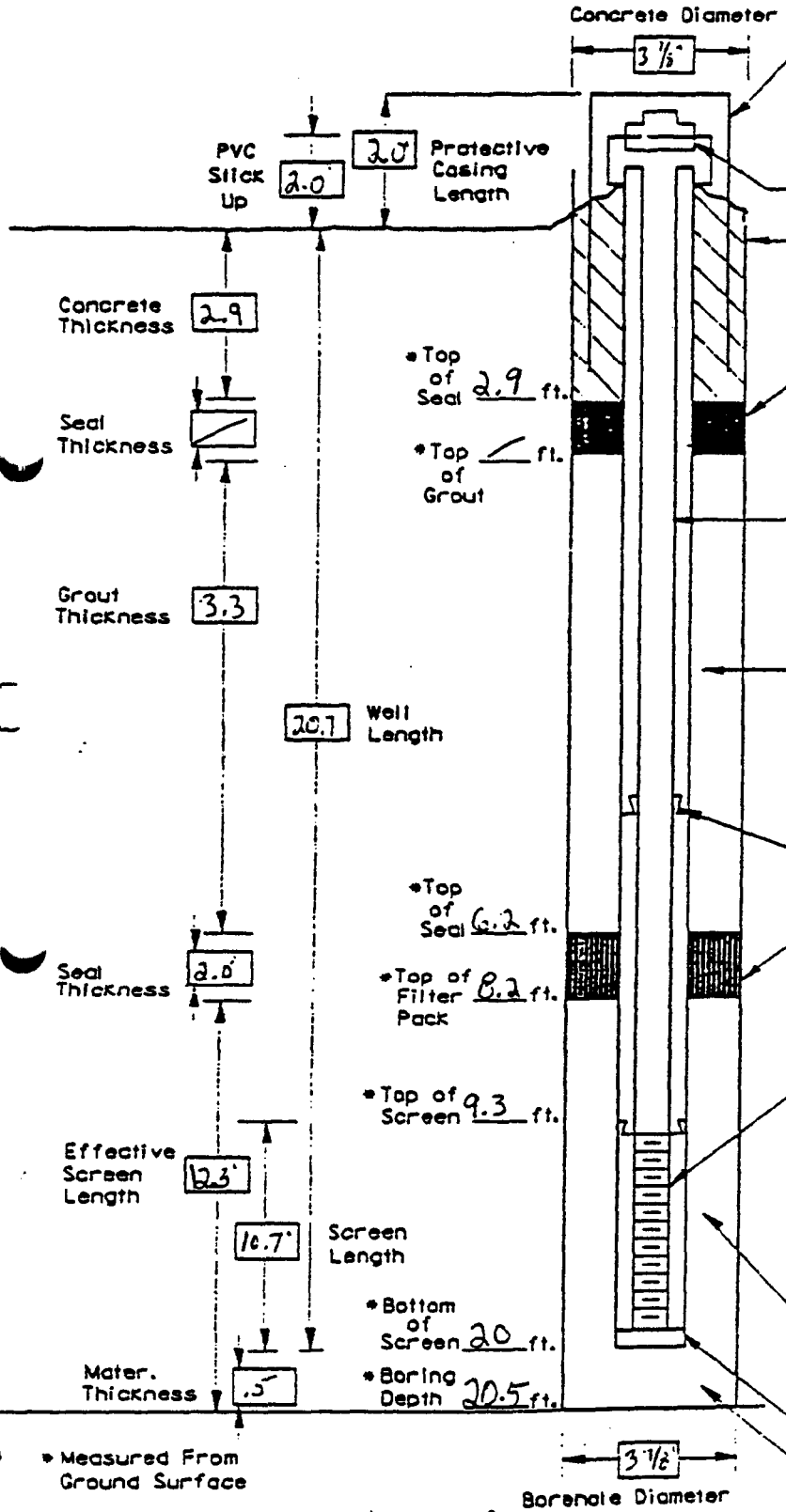
IN-FIELD HYDRAULIC CONDUCTIVITY SLUG TEST FIELD FORMS

Form 1C

Water Table Well Installation Diagram

Donohue
Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

Site: Himco Date: 9/10/91
Inspected By: _____ Project No. 2223 Well No. WT111-1
Driller/Contractor Mathes



PROTECTIVE CASING
Type Steel Vented (Yes)/No Type Steel - 4"
Diameter 4" Locked Yes
Length 4' Key # 2532

CAP/OR PLUG Vented (Yes)/No Type PVC

CONCRETE COLLAR
Cement 20 lbs. + Water 5 gal.
Total Quantity 5 gal.
Manufacturer _____

UPPER SEAL
Powder/Granular/Pellets Quantity _____ gal.
Hydrated _____ gal.. Time _____
Manufacturer _____

PIPE Type Stainless Steel Schedule 40
O.D. 2 1/8" I.D. 2"
Length/Sec. 10' No. Of Sec. 1 + 2.0' sec of 7'
Manufacturer _____

GROUT Type Bentonite cement
Mix 12 lbs. of bentonite +
_____ lbs. of _____ +
Water 30 gals. Total Quant. 15 gal.
Manufacturers _____

JOINTS Flush Threaded (Yes)/No _____
Teflon Taped (Yes)/No O-Ring Yes (No)
Manufacturer _____

LOWER SEAL
Powder/(Pellets) Quantity 5 gal.
Hydrated ≈5 gal..Time 1430
Manufacturer _____

SCREEN
Type Stainless steel Schedule 40
Length/Sec. 5' No. of Sec. 2
O.D. 2 1/8" I.D. 2"
Slot Size 0.010-inch No. Slots/ft. _____
Manufacturer _____

FILTER PACK Type(s) No. 50 sand
Source Colorado Volume 3.5 gal.
Manufacturer CSSI

PLUG OR CAP Type Stainless Length .5'

MATERIAL SP Poorly graded sand

GUARD POSTS
Type Steel - 4"
Yes
Key # 2532

WATER SOURCE Main Street with #
Notes: Protective Casing vent hole near ground surface

INFIELD HYDRAULIC CONDUCTIVITY SLUG TEST

Donohue ENGINEERS ARCHITECTS SCIENTISTS

SHEET 1 OF 2

PROJECT NO.: 20026 WELL NUMBER: WT IIIA

SITE: HIMCO LOGGER ID NUMBER:

CLIENT: USEPA TOTAL DEPTH OF WELL: 21.45'

WELL DRILLED BY: MATHES/DONOHUE DEPTH OF WATER IN WELL: ~~11.14'~~

DATE TEST PERFORMED: 11/19/91 INITIAL TRANSDUCER WATER LEVEL: ~~6.00 feet~~ 6.14

TIME TEST PERFORMED: STATIC TRANSDUCER WATER LEVEL: 6.14

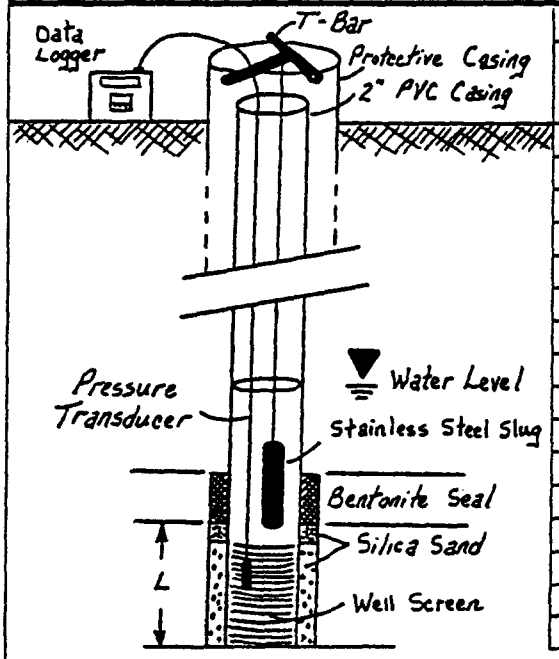
TOP OF PIPE ELEVATION: DIAMETER OF BOREHOLE: ~~2"~~ 3 7/8"

OBSERVATION WELL/PIEZOMETER (circle): DIAMETER OF PIPE: 2" S.S.

FALL/RISE TEST (circle) SCREEN LENGTH: 10'

FORMATION WELL SCREENED IN: EFFECTIVE SCREEN LENGTH* "L":

STATIC WATER LEVEL (T.C.P.): 12.96



*"L" length is less than the sand pack length if the water table intersects sand pack, where "L" will equal distance between water table and bottom of sand pack.

SILOG II LOGGING SEQUENCE

SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
1	35	1/5	7	7
2	20	1	20	27
3	15	5	75	102
4	15	10	150	252
5	15	30	450	702
6	10	60		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

PRESSURE TRANSDUCER PSI: 5

STAINLESS STEEL SLUG LENGTH: 4'

NOTES: Station #1

TEST PERFORMED BY: S. P. Advani DATE: 11/19/91

LOGGER DOWNLOADED BY: DATE:

CALCULATIONS BY: DATE:

COMPUTER FILE NAME:

Donohue ENGINEERS ARCHITECTS SCIENTISTS

INFIELD HYDRAULIC CONDUCTIVITY SLUG TEST

PROJECT NO.: 20026 | WELL NUMBER: WTIIIA

SITE: HIMCO | LOGGER ID NUMBER:

CLIENT: USEPA | TOTAL DEPTH OF WELL: 21.45

WELL DRILLED BY: MATHES/DONOHUE | DEPTH OF WATER IN WELL:

DATE TEST PERFORMED: 11/19/91 | INITIAL TRANSDUCER WATER LEVEL: 6.96

TIME TEST PERFORMED: | STATIC TRANSDUCER WATER LEVEL: 6.18

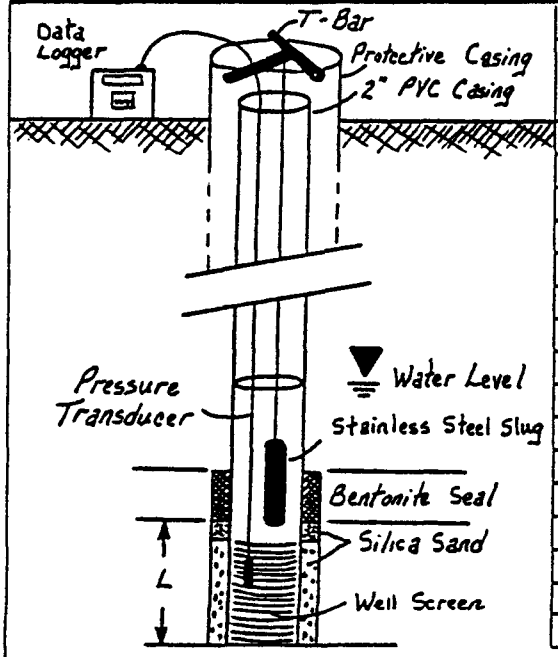
TOP OF PIPE ELEVATION: | DIAMETER OF BOREHOLE: 3 7/8"

OBSERVATION WELL/PIEZOMETER (circle): | DIAMETER OF PIPE: 2" S.S.

FALL/RISE TEST (circle) | SCREEN LENGTH: 10'

FORMATION WELL SCREENED IN: | EFFECTIVE SCREEN LENGTH* "L":

STATIC WATER LEVEL (T.C.P.): 12.46



SILOG II LOGGING SEQUENCE

SEGMENT NUMBER	NUMBER OF READINGS	INTERVAL (SEC.)	SEGMENT DURATION (SEC.)	ELAPSED TIME (SEC.)
1	35	1/5	7	7
2	20	1	20	27
3	15	5	75	102
4	15	10	150	252
5	15	30	450	702
6	10	60		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

*"L" length is less than the sand pack length if the water table intersects sand pack, where "L" will equal distance between water table and bottom of sand pack.

PRESSURE TRANSDUCER PSI: 5

STAINLESS STEEL SLUG LENGTH: 4'

NOTES: Station #2

TEST PERFORMED BY: | DATE:

LOGGER DOWNLOADED BY: | DATE:

CALCULATIONS BY: | DATE:

COMPUTER FILE NAME:

ORIGINAL

TECHNICAL MEMORANDUM NUMBER 28

DATE: November 27, 1991

TO: Vanessa Harris, Site Manager

CC: Roman Gau
Tom Dalton

FROM: Bill Schaefer

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump RI Phase II

PHASE II GROUNDWATER LEVEL MEASUREMENTS AND STAFF GAUGE READINGS

On November 19, 1991, Bill Schaefer and Steve Padovani of Donohue & Associates, Inc., measured the depth to groundwater in 18 monitoring wells at the Himco Dump in Elkhart, Indiana. Also, staff gauge readings were taken in the L pond, the small pond and the quarry pond.

Table 1 provides the depth to groundwater measured in 18 Himco wells on November 19, 1991. Table 2 provides staff gauge readings taken at Himco on November 19, 1991. Field forms are included in the Appendix.

BS:llw

A/R/HIMCO/AI6

Table 1

Groundwater Level Measurements
Himco Dump - Elkhart, Indiana

November 19, 1991

Well Number	Depth to Water (ft.)
101A	11.58
101B	11.45
101C	11.27
102A	10.92
102B	10.62
102C	11.01
103A	6.13
104A	12.44
105A	10.42
106A	9.51
111A	12.96
B2	6.98
CP-1 (150' SW of B nest)	4.64
D1 (NE corner of quarry)	16.17
E2	11.37
M2	16.24
O1	10.08
P1 (NW corner Co. Rd 10 & Nappanee St. Ext.)	8.86

Table 2

Staff Gauge Readings
Himco Dump - Elkhart, Indiana

November 19, 1991

Staff Gauge Location	Top of Gauge Reading (ft.)	Water Level (ft.)
Quarry Pond	6.60	4.19
L Pond	6.60	4.72
Small Pond	6.60	4.55

APPENDIX

Water Elevation Form
Staff Gauge Information Form

November 19, 1991

DONOHUE

WATER ELEVATION

PROJECT NO. 20026 SITE Hime Dump

WELL NUMBER	ELEVATION OF TOP OF PIPE	DEPTH TO WATER	WATER ELEVATION	DEPTH TO BOTTOM	WELL INTEGRITY				COMMENTS
					LOCKED	CAPPED	CRACKED	OBSTRUCT	
102B	768.805	10.62	758.19	67.10	✓	✓			
102C	769.22	11.01	758.21	-	✓	✓			Deeper than 100' - Limit of tape
102A	769.065	10.92	758.15	17.88	✓	✓			
01	771.11	16.17	754.94	21.96		✓			
01	763.34	10.08	753.26	29.52		✓			Flush
P1	761.19	8.86	752.33	23.33		✓		✓	Corner Co. Rd 10 & Nappanee Ext. FCA
106A	761.47	9.51	751.96	18.22	✓	✓			
101C	764.11	11.27	752.84	-	✓	✓			Deeper than 100' - Limit of tape
101B	764.23	11.45	752.78	-	✓	✓			Deeper than 100' - Limit of tape
101A	764.33	11.58	752.75	18.40	✓	✓			
M2	769.46	16.24	753.22	24.50		✓			
CP-1	760.36	4.64	755.72	19.94		✓			
B2	763.31	6.98	756.23	13.18		✓		✓	
103A	760.59	6.13	754.46	18.18	✓	✓			
104A	765.57	12.44	753.13	18.40	✓	✓			
105A	762.94	10.42	752.52	18.26	✓	✓			
E2	764.35	11.37	752.94	15.78		✓		✓	
111A	766.50	12.96	753.54	21.45	✓	✓			
Staff gauge 1	756.87	4.19	754.46						Staff gauge top 16.6' measure
Staff gauge 2	756.98	4.55	754.93						"
Staff gauge 3	756.79	4.72	754.91						"

DESCRIPTION OF SITE _____

SOIL CONDITIONS _____

WEATHER Cloudy 65°F TEMPERATURE 65°F

ENTERED ON COMPUTER ___ SIGNATURE _____ DATE 11/19/91

Staff Gauge Information Form

Donohue
Engineers, Architects & Scientists

Site: Himco Date: 11/19/91
By: Schaefer/Fedorenia Project No.: 2002.6

Staff Gauge No. 1
Location: Quarry Pond
Top of Pipe Elevation: _____
Date/Time: 11/19/91 / 0820 Water Level: 4.19'
Comments: Top of pipe 6.60'

Staff Gauge No. 3
Location: L Pond
Top of Pipe Elevation: _____
Date/Time: 11/19/91 / 0840 Water Level: 4.72'
Comments: Top of Pipe 6.60

Staff Gauge No. 2
Location: Small Pond
Top of Pipe Elevation: _____
Date/Time: 11/19/91 / 0842 Water Level: 4.55'
Comments: Top of Pipe 6.60

Staff Gauge No. _____
Location: _____
Top of Pipe Elevation: _____
Date/Time: _____ Water Level: _____
Comments: _____

ORIGINAL

TECHNICAL MEMORANDUM - NO. 27

DATE: November 5, 1991

TO: Vanessa Harris

FROM: Bill Schaefer

CC: Roman Gau
Tom Dalton
PMO Files
Work Assignment Files

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026.024
Himco Dump

SUMMARY OF PHASE I AND PHASE II SAMPLING ACTIVITIES

This technical memorandum has been written to accomplish two objectives.

The first objective is to present a count of samples by media collected by Donohue at the Himco Dump, Elkhart, Indiana, during Phases I and II of the Remedial Investigation (RI). This has been accomplished in attached Table 1.

The second objective is to list all the environmental samples collected by Donohue during Phases I and II of the RI at Himco. This objective has been accomplished in the form of two attached tables, Table 2 and Table 3. Table 2 lists samples collected during phase I; Table 3 lists samples collected during phase II.

ARCS/O/M/AG9

TABLE 1

NUMBER OF SAMPLES COLLECTED BY MEDIA
HIMCO DUMP RI

MEDIA	NO. OF PHASE I SAMPLES	NO. OF PHASE II SAMPLES	TOTAL NO. OF SAMPLES
Landfill Cap/Misc. Soil–Chemical	12	9	21
Landfill Cap–Geotechnical	5	5	10
Wetland Soil	16	3	19
Soil Sample from Soil Boring – Chemical	30	3	33
Soil Sample from Test Pit – Chemical	0	2	2
Soil Sample from Soil Boring – Geotechnical	18	0	18
Soil Sample from Soil Boring – TOC	16	0	16
Surface Water	12	9	21
Sediment	12	9	21
Leachate	0	4	4
Monitoring Wells	36	19	55
Private Wells	8	0	8
Waste Mass Gas	14	0	14
Field Blanks	6	4	10
Trip Blanks	19	11	30
Total No. of Samples	204	78	282

NOTE: Duplicate and Matrix Spike/Matrix Spike Duplicate Samples are not included in the number of samples.

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SURFICIAL SOIL

Landfill Cap – Chemical

SAMPLE ID (1)	DATE	ANALYSES
HD-GS01-01 (2)	11/8/90	VOA, BNA, PCB/P, METALS/CN
HD-GS02-01	11/8/90	VOA, BNA, PCB/P, METALS/CN
HD-GS03-01	11/9/90	VOA, BNA, PCB/P, METALS/CN
HD-GS04-01	11/9/90	VOA, BNA, PCB/P, METALS/CN
HD-GS05-01	11/10/90	VOA, BNA, PCB/P, METALS/CN
HD-GS06-01	11/10/90	VOA, BNA, PCB/P, METALS/CN
HD-GS07-01	11/11/90	VOA, BNA, PCB/P, METALS/CN
HD-GS08-01	11/11/90	VOA, BNA, PCB/P, METALS/CN
HD-GS09-01	11/11/90	VOA, BNA, PCB/P, METALS/CN
HD-GS10-01	11/12/90	VOA, BNA, PCB/P, METALS/CN
HD-GS11-01 (2)	11/12/90	VOA, BNA, PCB/P, METALS/CN
HD-GS12-01	11/12/90	VOA, BNA, PCB/P, METALS/CN

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SURFICIAL SOIL

Landfill Cap–Geotechnical

SAMPLE ID (1)	DATE	ANALYSES	LOCATION
HD–K21–01	11/8/90	GRAIN SIZE, ATTERBERG LIMITS, TRIAXIAL SHEAR	GE–01
HD–T05–01	11/13/90	GRAIN SIZE, ATTERBERG LIMITS, TRIAXIAL SHEAR, CONSOLIDATION	GE–02
HD–O15–01	11/13/90	GRAIN SIZE, ATTERBERG LIMITS, TRIAXIAL SHEAR	GE–03
HD–K14–01 (2)	11/13/90	GRAIN SIZE, ATTERBERG LIMITS, TRIAXIAL SHEAR, CONSOLIDATION	GE–04 GE–06
HD–D24–01	11/13/90	GRAIN SIZE, ATTERBERG LIMITS, TRIAXIAL SHEAR	GE–05

NOTES: – K21, T05, O15, K14 and D24 refer to samples collected at site survey grid line intersection points.

– Sample material for triaxial shear and consolidation testing was collected using Shelby tubes. Sample material for Grain size analysis and Atterberg Limits was collected using a hand auger.

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SURFICIAL SOIL

Wetland Soil

SAMPLE ID (1)	DATE	ANALYSES
HD-WS01-01	10/21/90	VOA, BNA, PCB/P
HD-WS01-02	11/6/90	METALS/CN
HD-WS02-01	10/21/90	VOA, BNA, PCB/P
HD-WS02-02	11/6/90	METALS/CN
HD-WS03-01	10/22/90	VOA, BNA, PCB/P
HD-WS03-02	11/6/90	METALS/CN
HD-WS04-01	10/22/90	VOA, BNA, PCB/P
HD-WS04-02	11/6/90	METALS/CN
HD-WS05-01 (2)	10/22/90	VOA, BNA, PCB/P
HD-WS05-02 (2)	11/7/90	METALS/CN
HD-WS06-01	10/23/90	VOA, BNA, PCB/P, METALS/CN
HD-WS07-01	10/20/90	VOA, BNA, PCB/P
HD-WS07-02	11/7/90	METALS/CN
HD-WS08-01	10/20/90	VOA, BNA, PCB/P
HD-WS08-02	11/7/90	METALS/CN
HD-WS09-01	10/20/90	VOA, BNA, PCB/P
HD-WS09-02	11/7/90	METALS/CN
HD-WS010-01	10/20/90	VOA, BNA, PCB/P
HD-WS10-02	11/7/90	METALS/CN
HD-WS11-01 (2)	10/20/90	VOA, BNA, PCB/P
HD-WS11-02 (2)	11/7/90	METALS/CN

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SURFICIAL SOIL

Wetland Soil (Continued)

SAMPLE ID (1)	DATE	ANALYSES
HD-WS12-01	10/20/90	VOA, BNA, PCB/P
HD-WS12-02	11/7/90	METALS/CN
HD-WS13-01	10/23/90	VOA, BNA, PCB/P, METALS/CN
HD-WS14-01	10/23/90	VOA, BNA, PCB/P, METALS/CN
HD-WS15-01	10/23/90	VOA, BNA, PCB/P, METALS/CN
HD-WS16-01	10/23/90	VOA, BNA, PCB/P, METALS/CN

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SOIL BORINGS

SAMPLE ID (1)	DATE	ANALYSES	DEPTH	LOCATION
HD-GT01A-01	11/12/90	VOA, BNA, PCB/P, METALS/CN, TOC	0'-2'	Boring B-01
HD-GT01B-01	11/12/90	VOC, BNA, PCB/P, METALS/CN	2'-4'	Boring B-01
HD-GT01C-01	11/12/90	VOC, BNA, PCB/P, METALS/CN	4'-6'	Boring B-01
HD-GT01D-01 (2)	11/12/90	VOC, BNA, PCB/P, METALS/CN	6'-8'	Boring B-01
HD-GT01F-01	11/12/90	VOC, BNA, PCB/P, METALS/CN	10'-12'	Boring B-01
HD-GT01-01	11/12/90	GRAIN SIZE, ATTERBERG LIMITS	14'-16'	Boring B-01
HD-GT02A-01	11/10/90	VOA, BNA, PCB/P, METALS/CN	0'-2'	Boring B-02
HD-GT02B-01	11/10/90	VOA, BNA, PCB/P, METALS/CN, TOC	2'-4'	Boring B-02
HD-GT02C-01	11/10/90	VOC, BNA, PCB/P, METALS/CN	4'-6'	Boring B-02
HD-GT02D-01	11/10/90	VOC, BNA, PCB/P, METALS/CN	6'-8'	Boring B-02
HD-GT02E-01	11/10/90	VOC, BNA, PCB/P, METALS/CN	8'-10'	Boring B-02
HD-GT02-01	11/10/90	GRAIN SIZE, ATTERBERG LIMITS	14'-16'	Boring B-02
HD-GT03A-01	11/11/90	VOA, BNA, PCB/P, METALS/CN	0'-2'	Boring B-03
HD-GT03B-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	2'-4'	Boring B-03
HD-GT03C-01 (2)	11/11/90	VOC, BNA, PCB/P, METALS/CN	4'-6'	Boring B-03
HD-GT03D-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	6'-8'	Boring B-03
HD-GT03E-01	11/11/90	TOC	8'-10'	Boring B-03
HD-GT03H-01	11/11/90	VOC, BNA, PCB/P, METALS/CN GRAIN SIZE, ATTERBERG LIMITS	14'-16'	Boring B-03
HD-GT04A-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	0'-2'	Boring B-04
HD-GT04B-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	2'-4'	Boring B-04
HD-GT04C-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	4'-6'	Boring B-04
HD-GT04D-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	6'-8'	Boring B-04
HD-GT04E-01	11/11/90	VOC, BNA, PCB/P, METALS/CN	8'-10'	Boring B-04
HD-GT04-01	11/11/90	GRAIN SIZE, ATTERBERG LIMITS	14'-16'	Boring B-04

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SOIL BORINGS (CONTINUED)

SAMPLE ID (1)	DATE	ANALYSES	DEPTH	LOCATION
HD-GT05B-01 (2)	11/9/90	VOA, BNA, PCB/P, METALS/CN	2'-4'	Boring B-05
HD-GT05E-01	11/9/90	VOC, BNA, PCB/P, METALS/CN	8'-10'	Boring B-05
HD-GT05F-01	11/9/90	VOC, BNA, PCB/P, METALS/CN	10'-12'	Boring B-05
HD-GT05G-01	11/9/90	VOC, BNA, PCB/P, METALS/CN	12'-14'	Boring B-05
HD-GT05H-01	11/9/90	VOC, BNA, PCB/P, METALS/CN, TOC GRAIN SIZE, ATTERBERG LIMITS	14'-16'	Boring B-05
HD-GT06A-01	11/8/90	VOC, BNA, PCB/P, METALS/CN, TOC	0'-2'	Boring B-06
HD-GT06C-01	11/8/90	VOC, BNA, PCB/P, METALS/CN, TOC	4'-6'	Boring B-06
HD-GT06D-01	11/8/90	GRAIN SIZE, ATTERBERG LIMITS	6'-8'	Boring B-06
HD-GT06E-01	11/8/90	VOC, BNA, PCB/P, METALS/CN, TOC	8'-10'	Boring B-06
HD-GT06G-01	11/8/90	VOC, BNA, PCB/P, METALS/CN, TOC	12'-14'	Boring B-06
HD-GT06H-01	11/8/90	VOC, BNA, PCB/P, METALS/CN, TOC	14'-16'	Boring B-06
HD-GT07-02-01	12/17/90	GRAIN SIZE, ATTERBERG LIMITS	28'-29'	Boring B-07
HD-GT07-04-01	12/17/90	GRAIN SIZE, ATTERBERG LIMITS	58'-60'	Boring B-07
HD-GT07-05-01	12/17/90	GRAIN SIZE, ATTERBERG LIMITS	158'-158.5'	Boring B-07
HD-GT07-06-01	12/17/90	GRAIN SIZE, ATTERBERG LIMITS	163'-164'	Boring B-07
HD-GT07-07-01	12/17/90	GRAIN SIZE, ATTERBERG LIMITS	174'-174.5'	Boring B-07
HD-GT08-01-01	12/19/90	GRAIN SIZE, ATTERBERG LIMITS	18'-19'	Boring B-08
HD-GT08-04-01	1/3/91	GRAIN SIZE, ATTERBERG LIMITS	143'-143.5'	Boring B-08
HD-GT08-05-01	1/3/91	GRAIN SIZE, ATTERBERG LIMITS	163'-164'	Boring B-08
HD-SB08-01	1/3/91	TOC, % SOLIDS	63'-63.5'	Boring B-08
HD-SB08-02	1/3/91	TOC, % SOLIDS	68'-68.5'	Boring B-08
HD-SB08-03	1/3/91	TOC, % SOLIDS	73'-73.5'	Boring B-08
HD-SB08-04	1/3/91	TOC, % SOLIDS	78'-78.5'	Boring B-08
HD-SB08-05	1/3/91	TOC, % SOLIDS	83'-83.5'	Boring B-08

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SOIL BORINGS (CONTINUED)

SAMPLE ID (1)	DATE	ANALYSES	DEPTH	LOCATION
HD-GT09-01-01	1/5/91	GRAIN SIZE, ATTERBERG LIMITS	53'-53.5'	Boring B-09
HD-GT09-06-01	1/6/91	GRAIN SIZE, ATTERBERG LIMITS	143'-145'	Boring B-09
HD-GT09-07-01	1/6/91	GRAIN SIZE, ATTERBERG LIMITS	163'-163.5'	Boring B-09
HD-SB09-01	1/5/91	TOC, % SOLIDS	18'-19'	Boring B-09
HD-SB09-02	1/5/91	TOC, % SOLIDS	23'-23.5'	Boring B-09
HD-SB09-03	1/5/91	TOC, % SOLIDS	28'-28.5'	Boring B-09
HD-SB09-04	1/5/91	TOC, % SOLIDS	33'-33.5'	Boring B-09
HD-SB09-05	1/5/91	TOC, % SOLIDS	48'-48.5'	Boring B-09
HD-GT10-01-01	1/8/91	GRAIN SIZE, ATTERBERG LIMITS	38'-39'	Boring B-10
HD-GT10-04-01	1/9/91	GRAIN SIZE, ATTERBERG LIMITS	158'-158.5'	Boring B-10
HD-GT10-05-01	1/9/91	GRAIN SIZE, ATTERBERG LIMITS	173'-174'	Boring B-10
HD-SB10-01	1/8/91	TOC, % SOLIDS	18'-18.5'	Boring B-10
HD-SB10-02	1/8/91	TOC, % SOLIDS	23'-23.5'	Boring B-10
HD-SB10-03	1/8/91	TOC, % SOLIDS	28'-28.5'	Boring B-10
HD-SB10-04	1/8/91	TOC, % SOLIDS	48'-50'	Boring B-10
HD-SB10-05	1/8/91	TOC, % SOLIDS	53'-54'	Boring B-10

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

GROUNDWATER

Monitoring Well

SAMPLE ID (1)	DATE	ANALYSES
HD-WT101A-01	11/28/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT101B-01 (2)	1/9/91	BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT101C-01	1/9/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102A-01	11/28/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102A	1/7/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102B-01	1/7/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102C-01	1/8/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT103A-01	11/28/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT104A-01 (2)	11/28/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT105A-01	11/29/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT105A	1/8/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT106A-01 (3)	11/27/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT106A	1/8/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB1-01	12/4/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB2-01	12/4/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB3-01	12/5/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB4-01	12/11/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTCP1-01 (2)	12/3/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTE2-01	12/12/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

GROUNDWATER

Monitoring Well (Continued)

SAMPLE ID (1)	DATE	ANALYSES
HD-WTE3-01 (3)	12/12/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTF1-01	12/13/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTF2-01	12/11/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTF3-01	12/13/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTG1-01	12/4/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTG3-01	12/13/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTI1-01	12/13/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTI2-01	12/29/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTI3-01	12/4/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTJ1-01 (3)	12/4/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTJ2-01	12/3/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTJ3-01	12/10/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTM1-01	12/5/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTM2-01	12/3/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTN1-01	11/29/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTO1-01	12/3/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTQ1-01	11/29/90	VOC, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE

TABLE 2
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

GROUNDWATER

Private Well

SAMPLE ID (1) (2) (3)	DATE	ANALYSES	WELL OWNER
HD-RW01-01	10/22/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Rumfelt (Deep)
HD-RW02-01	10/22/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Rumfelt (Shallow)
HD-RW03-01	10/23/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Freeman
HD-RW04-01	10/23/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Kolanowski (Deep)
HD-RW05-01	10/23/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Kolanowski (Shallow)
HD-RW06-01	10/23/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Geesaman
HD-RW07-01	10/24/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Klein
HD-RW08-01	10/24/90	VOA, BNA, PCB/P, METALS/CN, WATER QUALITY, BROMIDE	Bowers

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SURFACE WATER			
SAMPLE ID (1)	DATE	ANALYSES	LOCATION
HD-SS01-01 (2) (3)	10/17/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	L Pond
HD-SS02-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	L Pond
HD-SS03-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	L Pond
HD-SS04-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	L Pond
HD-SS05-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	Small Pond
HD-SS06-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	Small Pond
HD-SS07-01	10/18/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	Small Pond
HD-SS08-01	10/19/90	PCB/P, METAL/CN WATER QUALITY, BROMIDE	Small Pond
HD-SS08-02	11/6/90	BNA	Small Pond
HD-SS09-01	10/19/90	PCB/P, METAL/CN WATER QUALITY, BROMIDE	Quarry Pond
HD-SS09-02	11/6/90	BNA	Quarry Pond
HD-SS10-01	10/19/90	PCB/P, METAL/CN WATER QUALITY, BROMIDE	Quarry Pond
HD-SS10-02	11/6/90	BNA	Quarry Pond
HD-SS11-01 (2)	10/19/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	Quarry Pond
HD-SS12-01	10/19/90	VOA, BNA, PCB/P, METAL/CN WATER QUALITY, BROMIDE	Quarry Pond

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

SEDIMENT

SAMPLE ID (1)	DATE	ANALYSES	LOCATION
HD-SD01-01 (2)	10/17/90	VOA, BNA, PCB/P, TOTAL METALS/CN	L Pond
HD-SD02-01	10/17/90	VOA, BNA, PCB/P, TOTAL METALS/CN	L Pond
HD-SD03-01	10/17/90	VOA, BNA, PCB/P, TOTAL METALS/CN	L Pond
HD-SD04-01	10/18/90	VOA, BNA, PCB/P, TOTAL METALS/CN	L Pond
HD-SD05-01	10/18/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Small Pond
HD-SD06-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Small Pond
HD-SD07-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Small Pond
HD-SD08-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Small Pond
HD-SD09-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Quarry Pond
HD-SD10-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Quarry Pond
HD-SD11-01 (2)	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Quarry Pond
HD-SD12-01	10/20/90	VOA, BNA, PCB/P, TOTAL METALS/CN	Quarry Pond

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

WASTE MASS GAS		
SAMPLE ID (1)	DATE	ANALYSIS
HD-TT01-01	11/7/90	VOA
HD-TT02-01	11/7/90	VOA
HD-TT03-01	11/7/90	VOA
HD-TT04-01	11/13/90	VOA
HD-TT05-01	11/13/90	VOA
HD-TT06-01	11/13/90	VOA
HD-TT07-01	11/13/90	VOA
HD-FBTT08-01	11/13/90	VOA
HD-TBTT09-01	11/13/90	VOA
HD-TT10-01	11/13/90	VOA
HD-TT11-01	11/13/90	VOA
HD-TT12-01	11/13/90	VOA
HD-TT13-01	11/13/90	VOA
HD-TT14-01	11/14/90	VOA
HD-TT15-01	11/14/90	VOA
HD-TT16-01 (2)	11/14/90	VOA
HD-TTMS-01	11/14/90	VOA
HD-TTMSD-01	11/14/90	VOA
HD-TTMS-02	11/14/90	VOA
HD-TTMSD-02	11/14/90	VOA

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

FIELD BLANKS

SAMPLE ID (1)	DATE	ANALYSES
HD-FBSS-01	10/17/90	VOA, BNA, PCB/P, METALS/CN WATER QUALITY, BROMIDE
HD-FBSS-02	10/19/90	VOA, BNA, PCB/P, METALS/CN WATER QUALITY, BROMIDE
HD-FBRW01-01	10/24/90	VOA, BNA, PCB/P, METALS/CN WATER QUALITY, BROMIDE
HD-WTFB105A-01	11/29/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTFBO1-01	12/3/90	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTFBO1	1/9/91	TOTAL and DISSOLVED METALS/CN WATER QUALITY, BROMIDE

TABLE 2

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE I

TRIP BLANKS

SAMPLE ID (1)	DATE	ANALYSIS
Trip Blank (EHR-03 and EHR-05)	10/17/90	VOA
Trip Blank (EHR-16 and EHR-17)	10/18/90	VOA
Trip Blank (EHR-28)	10/19/90	VOA
Trip Blank (EHR-54)	10/22/90	VOA
Trip Blank (EHR-61 and EHR-62)	10/23/90	VOA
Trip Blank (EHR-68)	10/24/90	VOA
HD-TB01	11/29/90	VOA
HD-TB02	11/28/90	VOA
HD-TB03	11/29/90	VOA
HD-TB04	12/3/90	VOA
HD-TB05	12/4/90	VOA
HD-TB06	12/5/90	VOA
HD-TB07	12/12/90	VOA
HD-TB08	12/12/90	VOA
HD-TB09	12/13/90	VOA
HD-TB10	1/7/91	VOA
HD-TB11	1/8/91	VOA
HD-TB12	1/9/91	VOA
HD-TB13	1/9/91	VOA

(1) Explanation of Sample ID designations

All samples collected at Himco have been identified using this format: HD-WS04-01. This sample ID designates first wetland soil sample collected at Himco Dump at location WS04. If a second sample was collected from a location, it was identified in the following manner: HD-WT103A-02. This designates the second groundwater sample collected from well WT103A.

Abbreviations used in Sample ID designations include:

HD – Himco Dump
WS – Wetland soil sample
GE – Geotechnical soil sample
GT – Soil sample collected from a soil boring
GS – Soil sample collected from landfill cap
SS – Surface water sample
SD – Sediment sample
WT – Water Table well
RW – Private well
TT – Waste Mass gas sample
TB – Trip Blank
FB – Field Blank

(2) A duplicate sample was collected at this location.
(3) A matrix spike/matrix spike duplicate sample was collected at this location.

TABLE 3
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

SURFICIAL SOIL

Hand Auger Phase II Soil Samples

SAMPLE ID (1)	DATE	ANALYSES
HD-HS01-01	9/16/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS02-01	9/16/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS03-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS04-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS05-01 (2)	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS06-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS07-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS08-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-HS09-01	9/19/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE

Soil Sample from Test Pit – Chemical

SAMPLE ID (1)	DATE	ANALYSES
HD-TL3DS1-01	9/12/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-TL3DS2-01	9/12/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE

Wetland Soil

SAMPLE ID (1)	DATE	ANALYSES
HD-WS17-01	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-WS18-01	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE
HD-WS19-01	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE

TABLE 3
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

SURFICIAL SOIL

Landfill Cap–Geotechnical

SAMPLE ID (1)	DATE	ANALYSES
HD–GE07–01	9/11/91	TRIAXIAL COMPRESSION
HD–GE08–01	9/11/91	TRIAXIAL COMPRESSION
HD–GE09–01	9/119/91	TRIAXIAL COMPRESSION
HD–GE10–01	9/11/91	TRIAXIAL COMPRESSION
HD–GE11–01	9/11/91	TRIAXIAL COMPRESSION

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

SOIL BORING				
SAMPLE ID (1)	DATE	ANALYSES	DEPTH	LOCATION
HD-GT11A-01 (2)	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	0'-2'	Boring B-11
HD-GT11B-01	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	5'-7'	Boring B-11
HD-GT11C-01	9/10/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	10'-12'	Boring B-11

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

SURFACE WATER

SAMPLE ID (1)	DATE	ANALYSES	LOCATION
HD-SS08-02	9/16/91	VOA	Small Pond
HD-SS09-02	9/19/91	VOA	Quarry Pond
HD-SS010-02	9/19/91	VOA	Quarry Pond
HD-SS13-01	9/16/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	L Pond
HD-SS14-01	9/16/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	L Pond
HD-SS15-01 (2) (3)	9/17/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Small Pond
HD-SS16-01	9/17/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Quarry Pond
HD-SS17-01	9/17/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Quarry Pond
HD-SS18-01	9/17/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Quarry Pond
HD-SS19-01	9/18/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Background Pond
HD-SS20-01	9/18/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Background Pond
HD-SS21-01	9/18/91	VOA, BNA, PCB/P, TOTAL AND DISSOLVED METALS/CN, WATER QUALITY, BROMIDE	Background Pond

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

SEDIMENT

SAMPLE ID (1)	DATE	ANALYSES	LOCATION
HD-SD13-01	9/16/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	L Pond
HD-SD14-01	9/16/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	L Pond
HD-SD15-01 (2) (3)	9/17/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Small Pond
HD-SD16-01	9/17/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Quarry Pond
HD-SD17-01	9/17/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Quarry Pond
HD-SD18-01	9/17/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Quarry Pond
HD-SD19-01	9/18/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Background Pond
HD-SD20-01	9/18/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Background Pond
HD-SD21-01	9/18/91	VOA, BNA, PCB/P TOTAL METALS/CN, TOC, GRAIN SIZE	Background Pond

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

LEACHATE		
SAMPLE ID (1)	DATE	ANALYSES
HD-TL01-01 (3)	9/13/91	VOA, BNA, PCB/P TOTAL METALS/CN, WATER QUALITY
HD-TL02-01	9/13/91	VOA, BNA, PCB/P TOTAL METALS/CN, WATER QUALITY
HD-TL04-01 (2)	9/12/91	VOA, BNA, PCB/P TOTAL METALS/CN, WATER QUALITY
HD-TL05-01	9/13/91	VOA, BNA, PCB/P TOTAL METALS/CN, WATER QUALITY

TABLE 3
SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

GROUNDWATER

Monitoring Well

SAMPLE ID (1)	DATE	ANALYSES
HD-WT101A-02	9/23/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT101B-02 (2)	9/23/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT101C-02	9/23/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102A-02	9/24/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102B-02	9/24/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT102C-02	9/24/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT103A-02	9/24/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT104A-02	9/24/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT105A-02	9/25/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT106A-02	9/25/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WT111A-01 (2) (3)	9/25/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB2-02	9/26/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB3-02	9/26/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTB4-02	9/26/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTCP1-02	9/26/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTE2-02	9/25/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTM1-02 (3)	9/26/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTM2-02	9/25/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE
HD-WTP-01	9/23/91	VOA, BNA, PCB/P, TOTAL and DISSOLVED METALS/CN, WATER QUALITY, BROMIDE

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

TRIP BLANKS

SAMPLE ID (1)	DATE	ANALYSES
HD-TB14	9/11/91	VOA
HD-TB15	9/11/91	VOA
HD-TB16	9/13/91	VOA
HD-TB17	9/16/91	VOA
HD-TB18	9/17/91	VOA
HD-TB19	9/18/91	VOA
HD-TB20	9/19/91	VOA
HD-WTTB21	9/23/91	VOA
HD-WTTB22	9/24/91	VOA
HD-WTTB23	9/25/91	VOA
HD-WTTB24	9/26/91	VOA

TABLE 3

SUMMARY OF SAMPLES COLLECTED
HIMCO DUMP RI
PHASE II

FIELD BLANKS

SAMPLE ID (1)	DATE
HD-FBTL05-01	9/13/91
HD-FBSS20-01	9/18/91
HD-WTFB104-02	9/24/91
HD-WTFBM1-02	9/26/91

NOTES: (1) Explanation of Sample ID designations

All samples collected at Himco have been identified using this format: HD-HS04-01. This sample ID designates the first hand auger soil sample collected at Himco Dump at location HS04. If a second sample was collected from a location, it was identified in the following manner: HD-WT103A-02. This designates the second groundwater sample collected from well WT103A.

Abbreviations used in Sample ID designations include:

HD – Himco Dump
TL – Leachate sample or soil sample collected from a leachate trench.
WS – Wetland soil sample
DS – Deep soil sample
GE – Geotechnical soil sample
GT – Soil sample collected from a soil boring
SS – Surface water sample
SD – Sediment sample
WT – Water Table well
TB – Trip Blank
FB – Field Blank

(2) A duplicate sample was collected at this location.

(3) A matrix spike/matrix spike duplicate sample was collected at this location

TECHNICAL MEMORANDUM NUMBER 29

DATE: May 12, 1992

TO: Himco File

FROM: Mehdi Geraminegad

SUBJECT: EPA ARCS Region V Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
SEC Donohue Project No. 20026.025
Himco Landfill RI/FS

GEOTECHNICAL DATA PRESENTATION- ROUND II SAMPLING

The geotechnical testing for Round II sampling was limited to grain size analysis of surface and surficial (from test pits) samples from the site. A total of 32 samples were analyzed. Table 1 presents a summary of test results. In general, except sediment samples SD 14-01, SD16-01, SD17-01, SD18-01, and SD21-01, remaining samples were classified as sand, with the majority being classified as poorly graded sand. Grain size distribution curves for these samples are included in this report.

MG:llw

A/R/HIMCO/AR4

TABLE 1

SUMMARY OF PHASE II GEOTECHNICAL TESTING

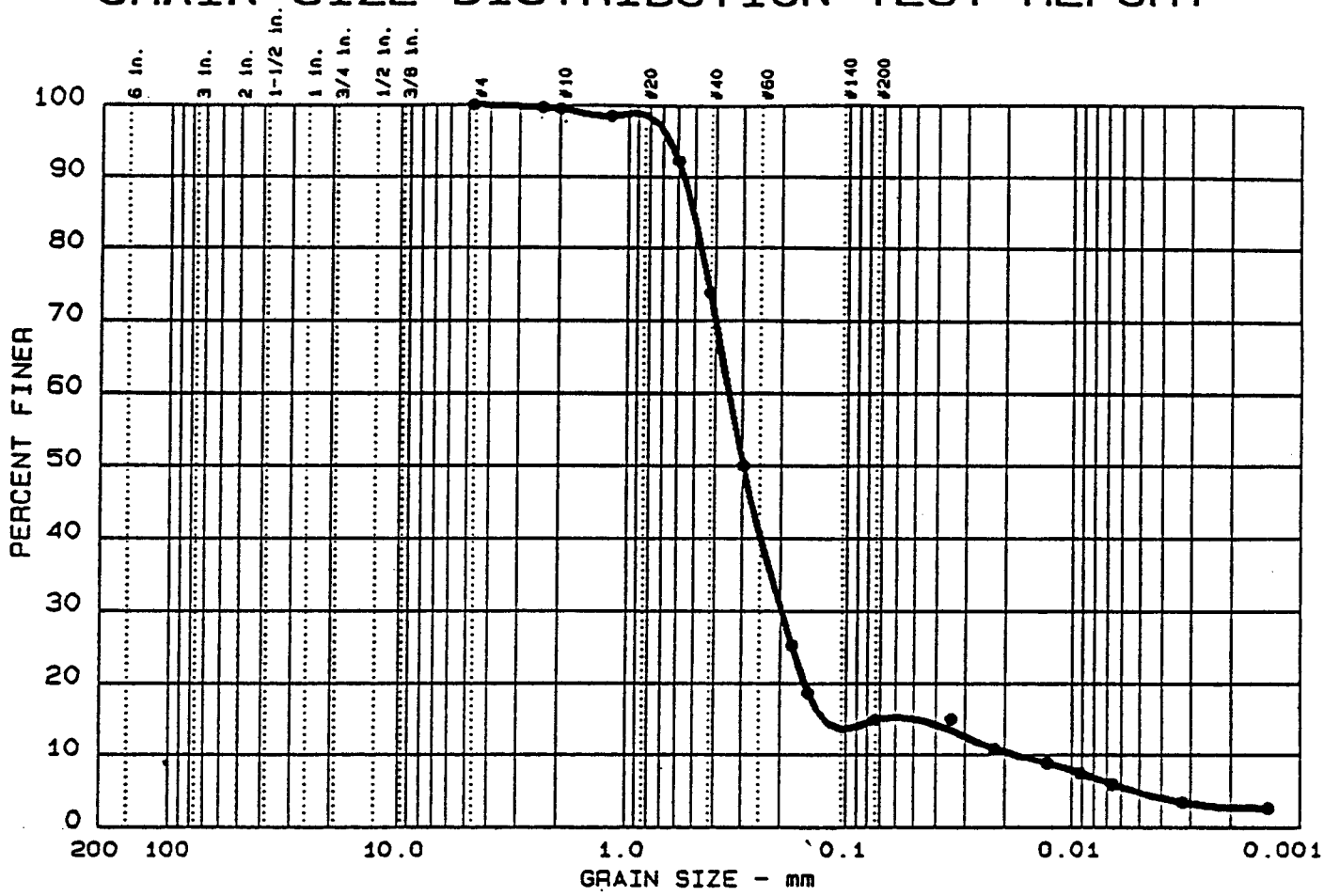
Sample Designation	Percent Sand and Gravel (%)	Percent Clay and Silt (%)	Unified Classification
GT11A-01	86.1	14.8	SM
GT11A-01(1)	86.2	13.8	SM
GT11B-01	91.1	8.9	SP
GT11C-01	96.6	3.4	SP
WS17-01	97.2	2.8	SP
WS18-01	98.2	1.8	SP
WS19-01	94.6	5.4	SP
HS01-01	97.7	2.3	SP
HS02-01	97.7	2.3	SP
HS03-01	97.2	2.8	SP
HS03-01(2)	97.8	2.2	SP
HS04-01	96.9	3.1	SP
HS04-01(2)	99.1	1.5	SP
HS05-01	98.8	1.2	SP
HS05-01(1)	98.7	1.5	SP
TL3DS1-01	88.3	11.7	SM-SW
TL3DS2-01	87.9	12.1	SM-SW
SD13-01	98.4	1.6	SP
SD14-01	42.1	57.9	CL-ML
SD15-01	96.3	3.7	SP
SD15-01(1)	96.3	3.7	SP
SD16-01	20.1	79.9	CL-ML
SD17-01	13.3	86.7	CL-ML
SD18-01	39.5	60.5	CL-ML
SD19-01	86.8	13.2	SM-SW
SD20-01	49.2	50.8	SM-SW
SD21-01	23.7	76.3	CL-ML
HS06-01	88.6	11.4	SM-SW
HS07-01	81	19	SM-ML
HS08-01	89.8	10.2	SP
HS08-01(2)	89.1	10.9	SP
HS09-01	93.8	6.2	SP

(1) Field Duplicate Sample
(2) Laboratory Duplicate
Uniformity coefficient (CU) less than 6 is classified as poorly graded

HD-GT11A-C1

00001

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	0.1	85.1	10.1	4.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.50	0.35	0.30	0.199	0.1268	0.0175	6.53	19.7

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
◆ Location: -02

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

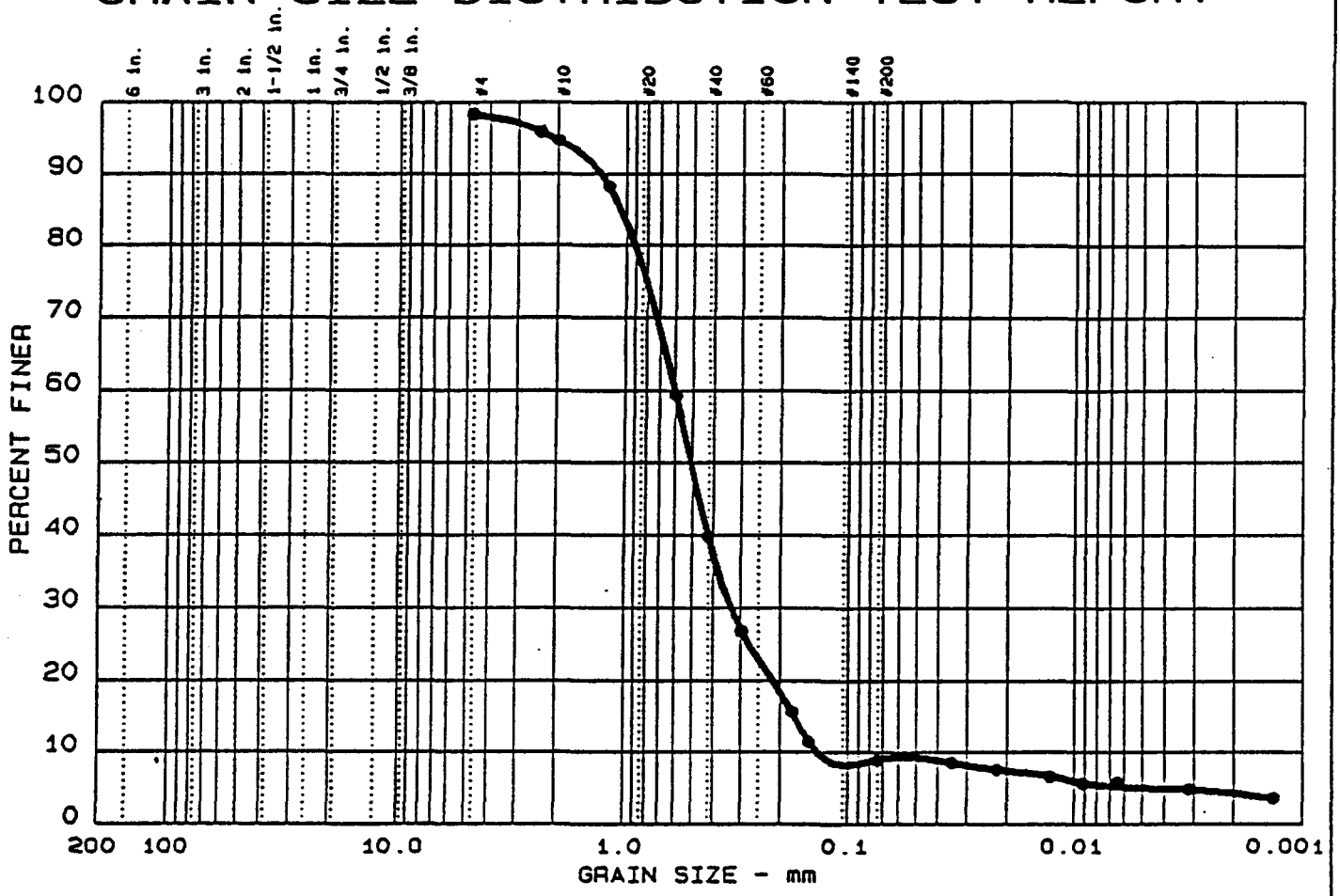
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-GT11B-C1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	1.8	89.3	4.0	4.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			1.06	0.60	0.50	0.332	0.1722	0.1368	1.35	4.4

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -04

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

GRAIN SIZE DISTRIBUTION TEST REPORT

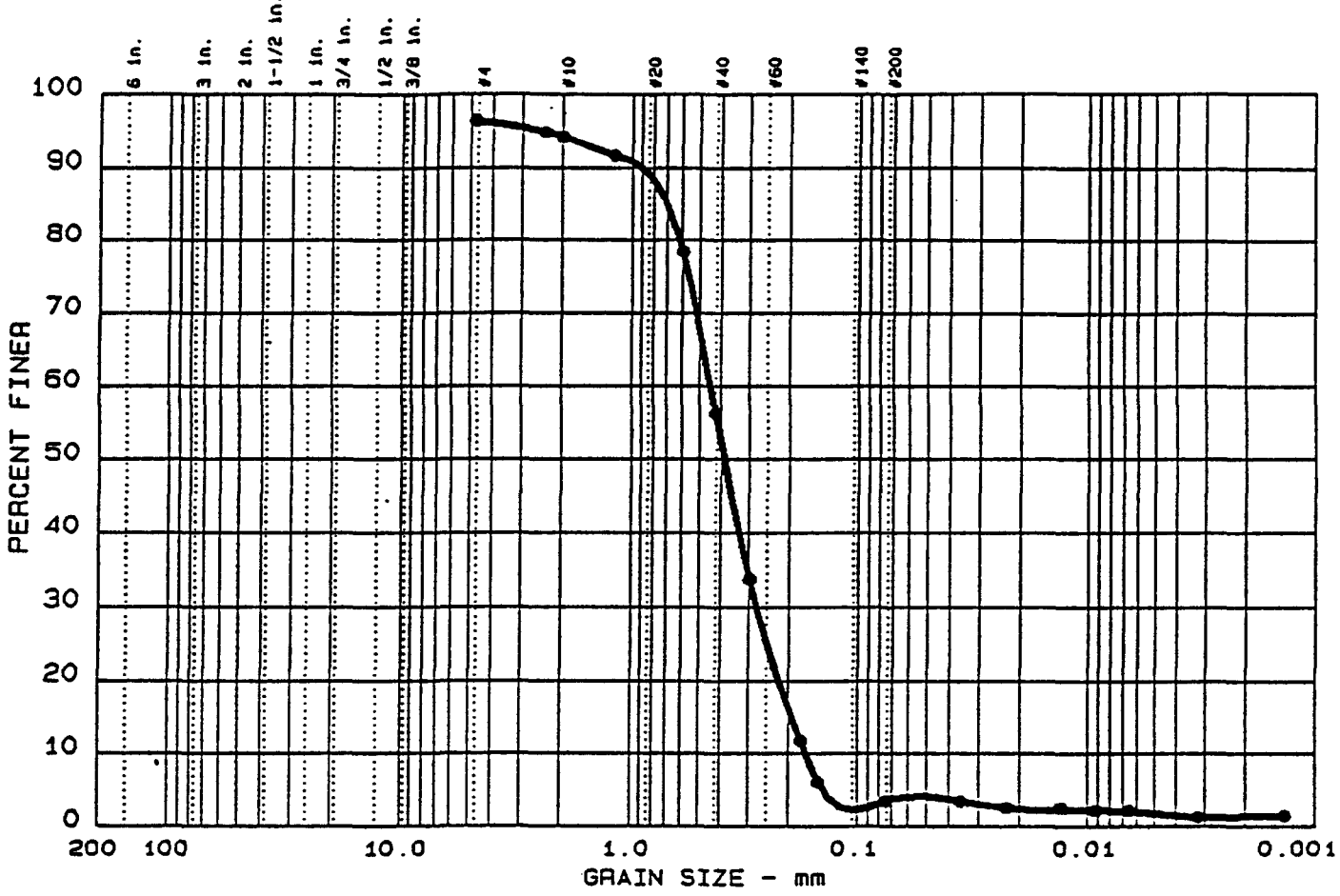
ATEC Associates, Inc.

Figure No.

HD-GT11C-01

00007

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	3.8	92.8	1.8	1.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.70	0.44	0.38	0.277	0.1941	0.1688	1.03	2.6

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -06

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

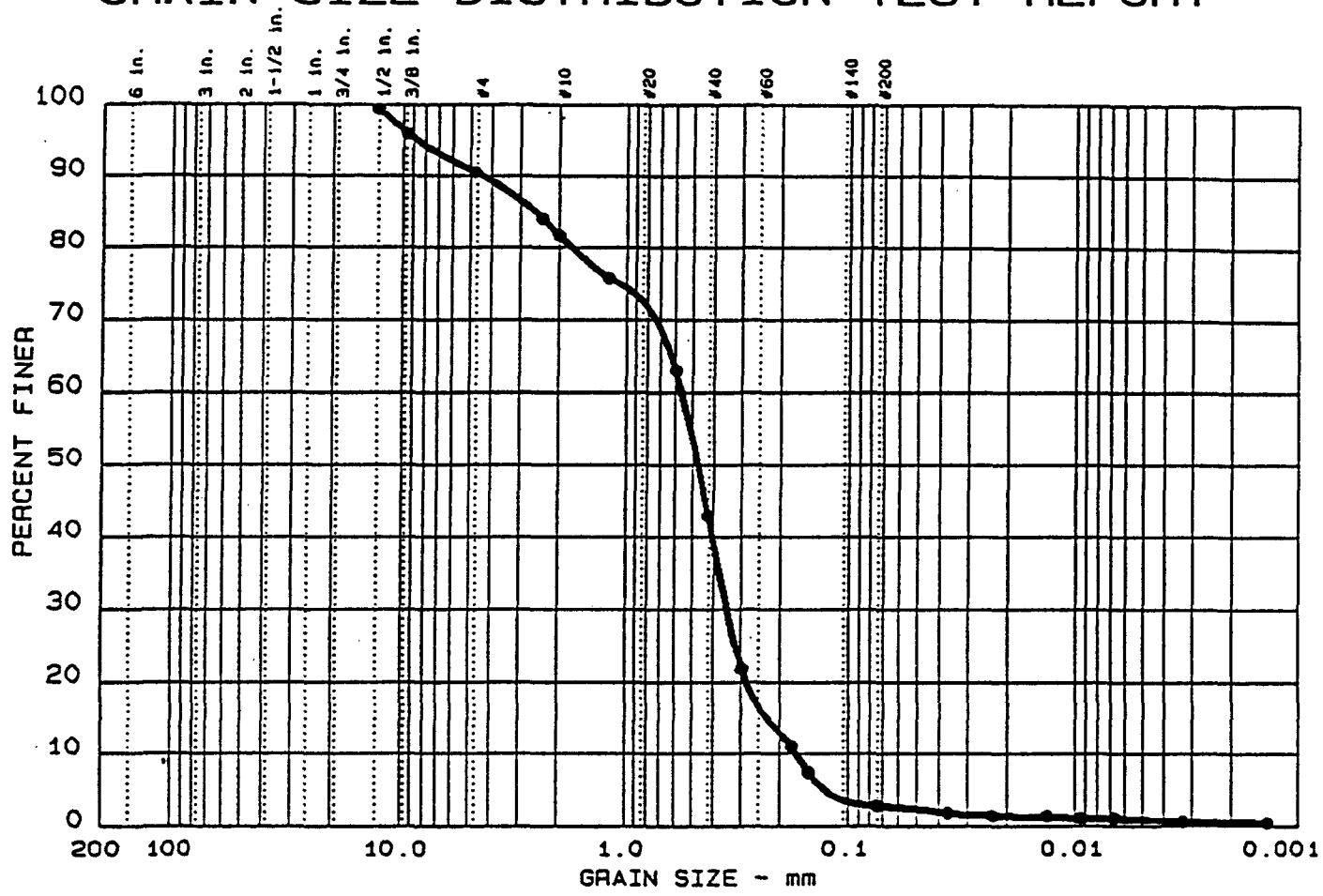
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-WS17-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	9.6	87.6	1.9	0.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			2.60	0.55	0.47	0.346	0.2312	0.1675	1.29	3.3

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -10

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

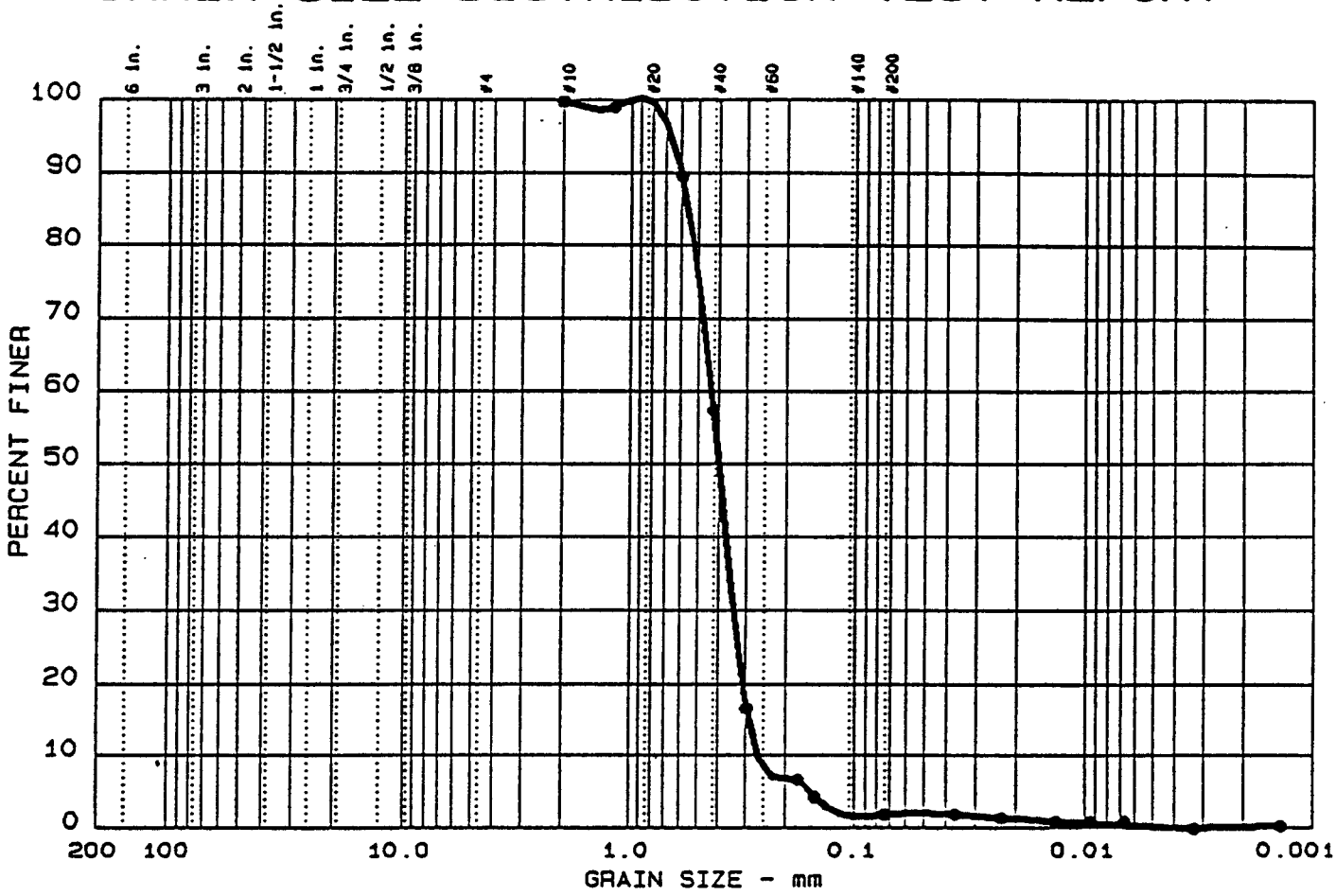
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-WS18-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	0.0	98.2	1.7	0.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.55	0.43	0.40	0.339	0.2911	0.2655	1.01	1.6

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -12

Date: 10-19-91

Remarks:

+ #10 Material:

Mostly sticks and grass

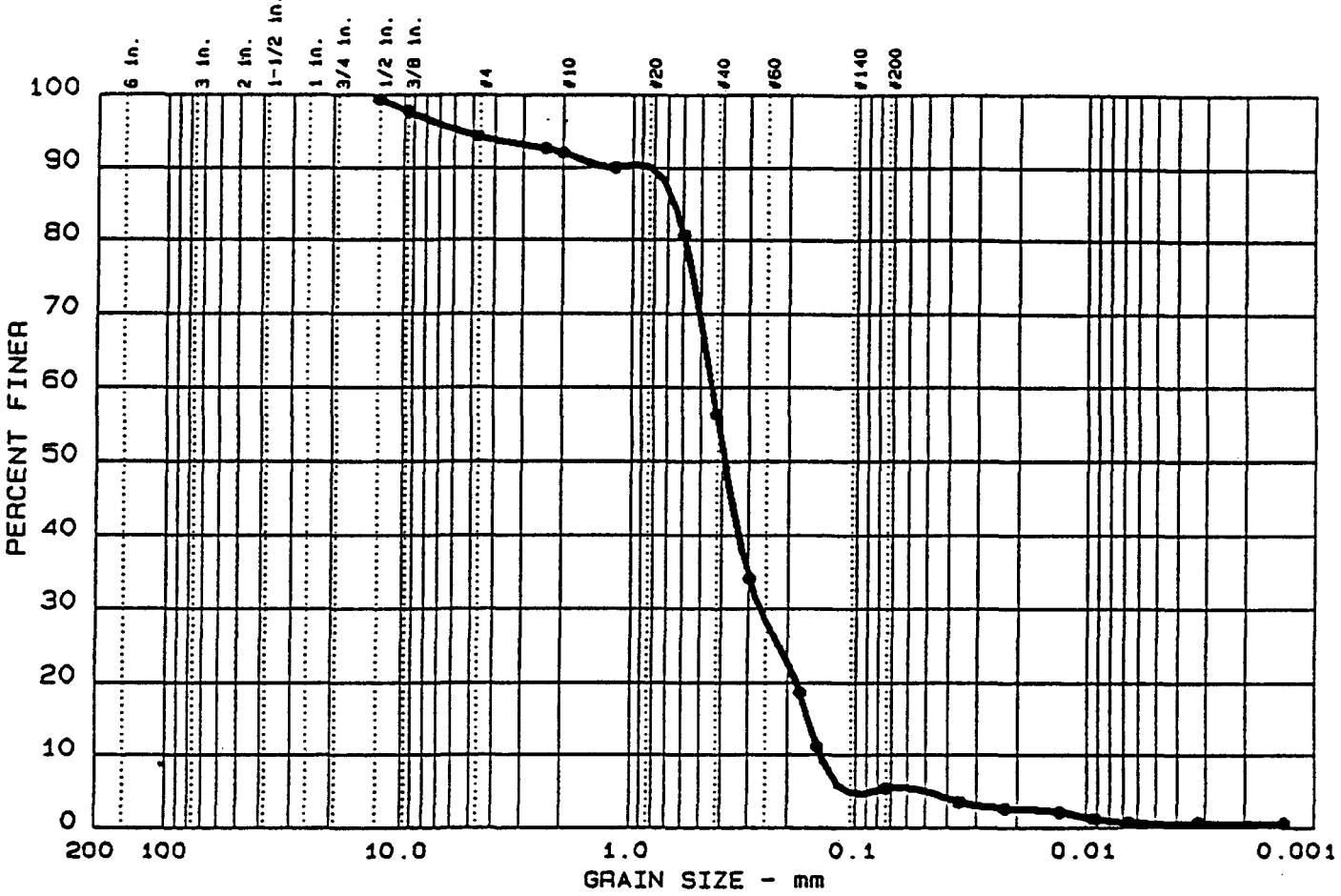
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-WS19-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	5.8	88.8	4.8	0.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.65	0.44	0.39	0.267	0.1627	0.1442	1.12	3.1

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -14

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT
ATEC Associates, Inc.

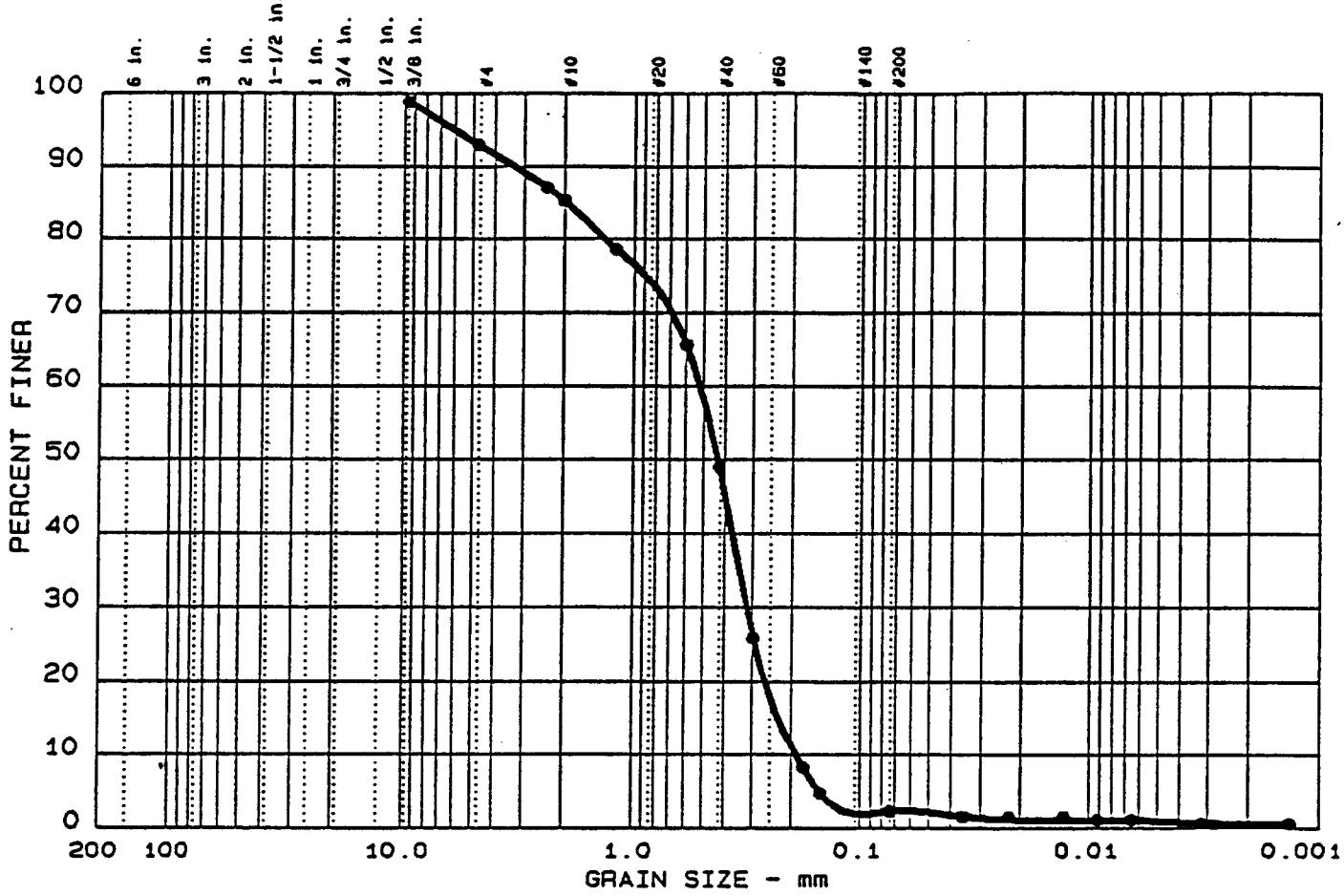
Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

Figure No.

HD-HSC1-01

0032

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	8	0.0	7.2	90.5	1.4	0.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			1.95	0.51	0.43	0.318	0.2307	0.1914	1.03	2.7

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -16

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

GRAIN SIZE DISTRIBUTION TEST REPORT

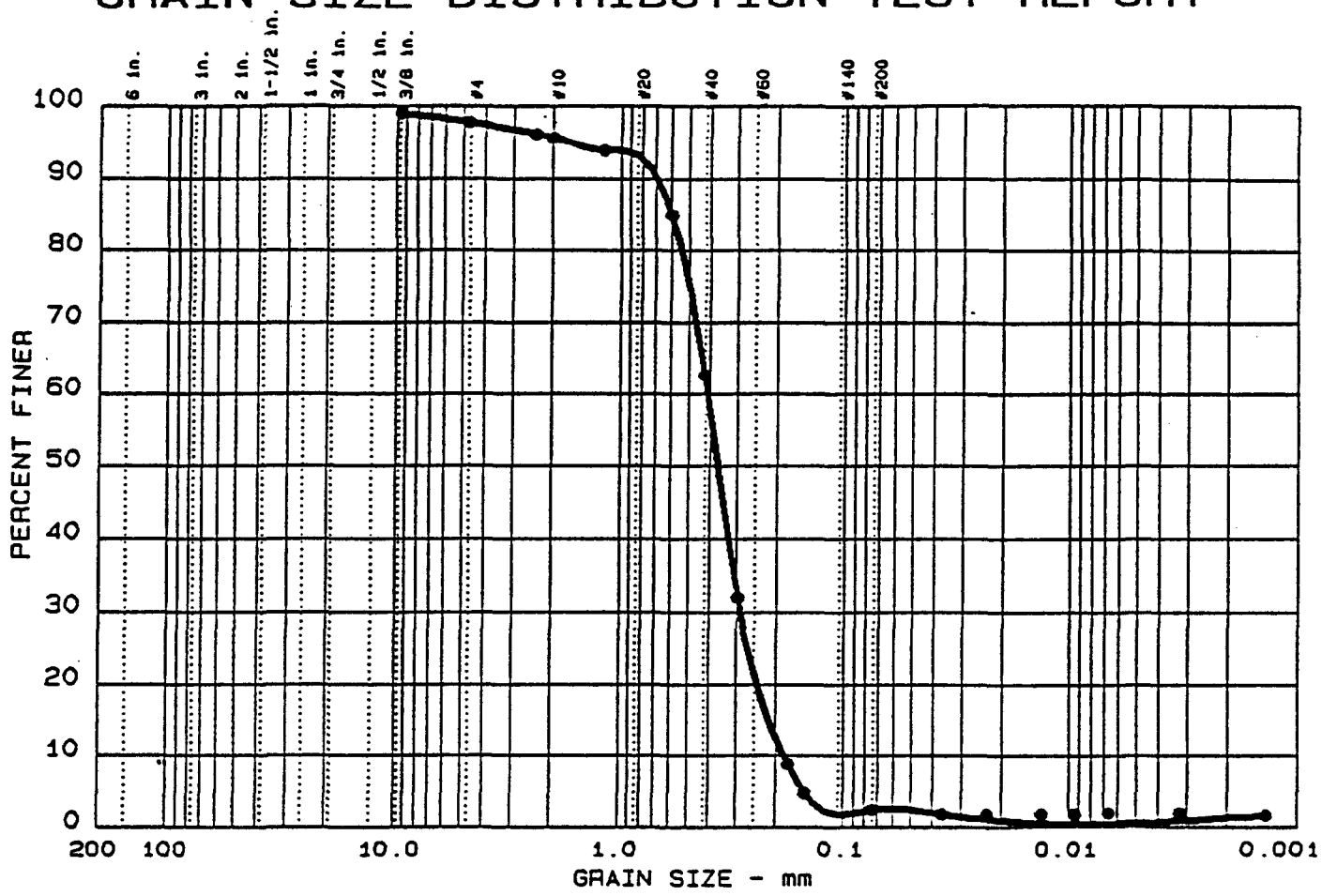
ATEC Associates, Inc.

Figure No.

HD-HSC2-01

00035

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	9	0.0	2.4	95.3	1.8	0.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●			0.59	0.41	0.37	0.289	0.2168	0.1845	1.11	2.2

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -18

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

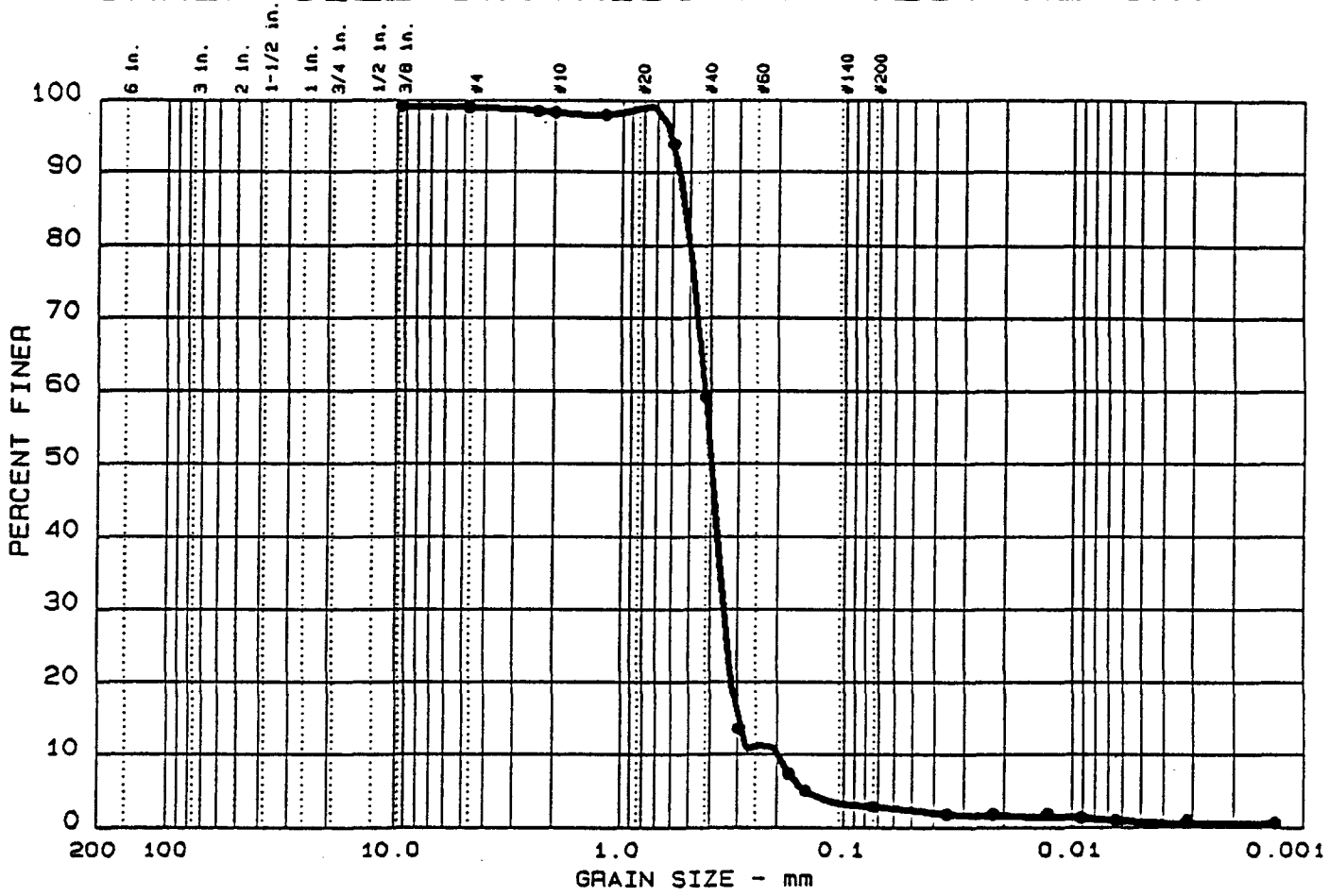
+ #10 Material:
Sub-angular-Sub-rounded
and hard

Figure No.

HD-HSC3-01

00033

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	10	0.0	1.1	96.1	2.1	0.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.52	0.42	0.40	0.347	0.3032	0.1980	1.44	2.1

	MATERIAL DESCRIPTION	USCS	AASHTO
●		n	

Project No.: 21-12392
Project: SAS 6728-E
● Location: -20

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

GRAIN SIZE DISTRIBUTION TEST REPORT

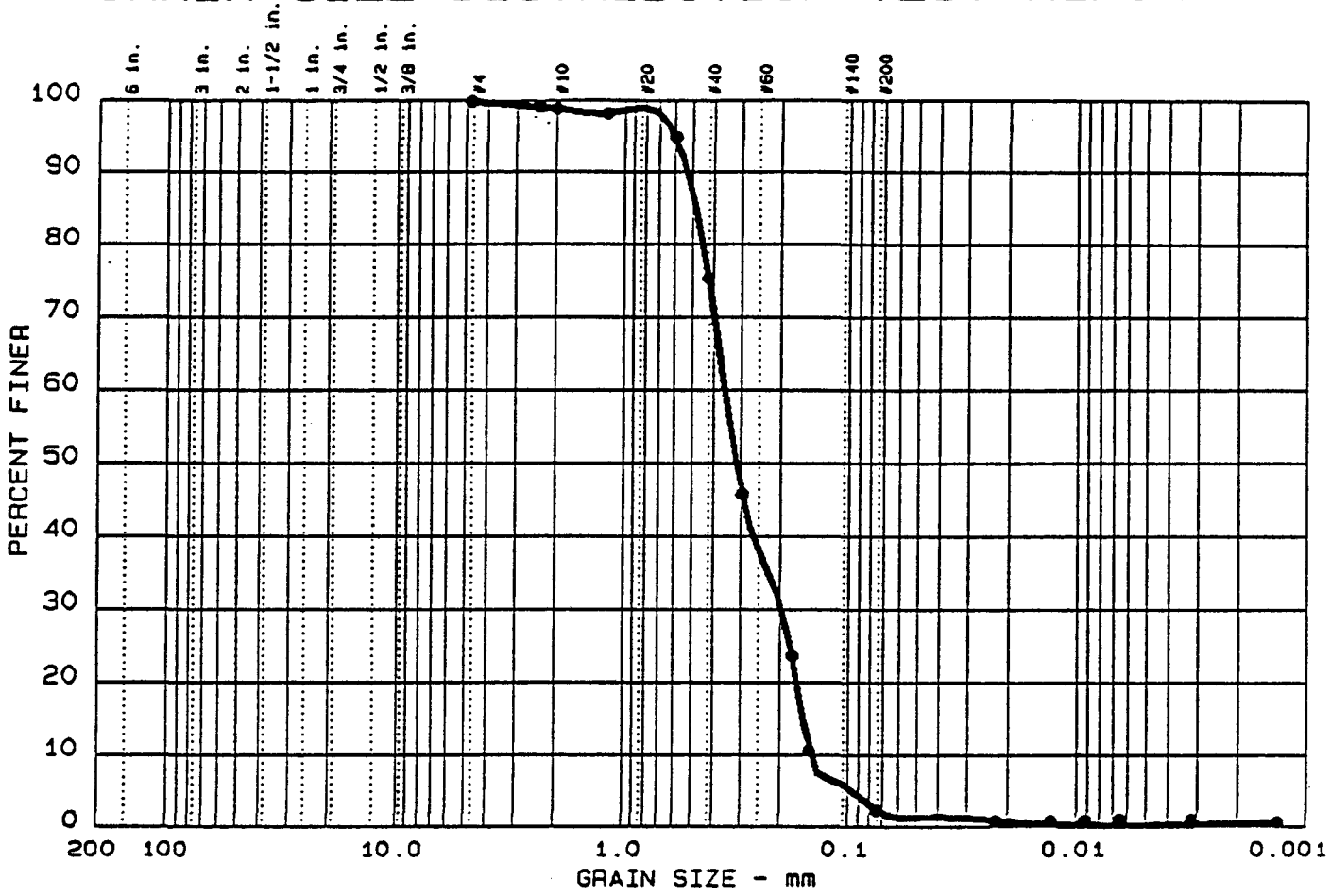
ATEC Associates, Inc.

Figure No. 10

LABORATORY DUPLICATE

HD-HS03-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	11	0.0	0.3	97.5	2.1	0.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.48	0.35	0.32	0.197	0.1589	0.1474	0.74	2.4

MATERIAL DESCRIPTION	USCS	AASHTO
●	n	

Project No.: 21-12392
Project: SAS 6728-E
● Location: -20 QC

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

+ #10 Material:

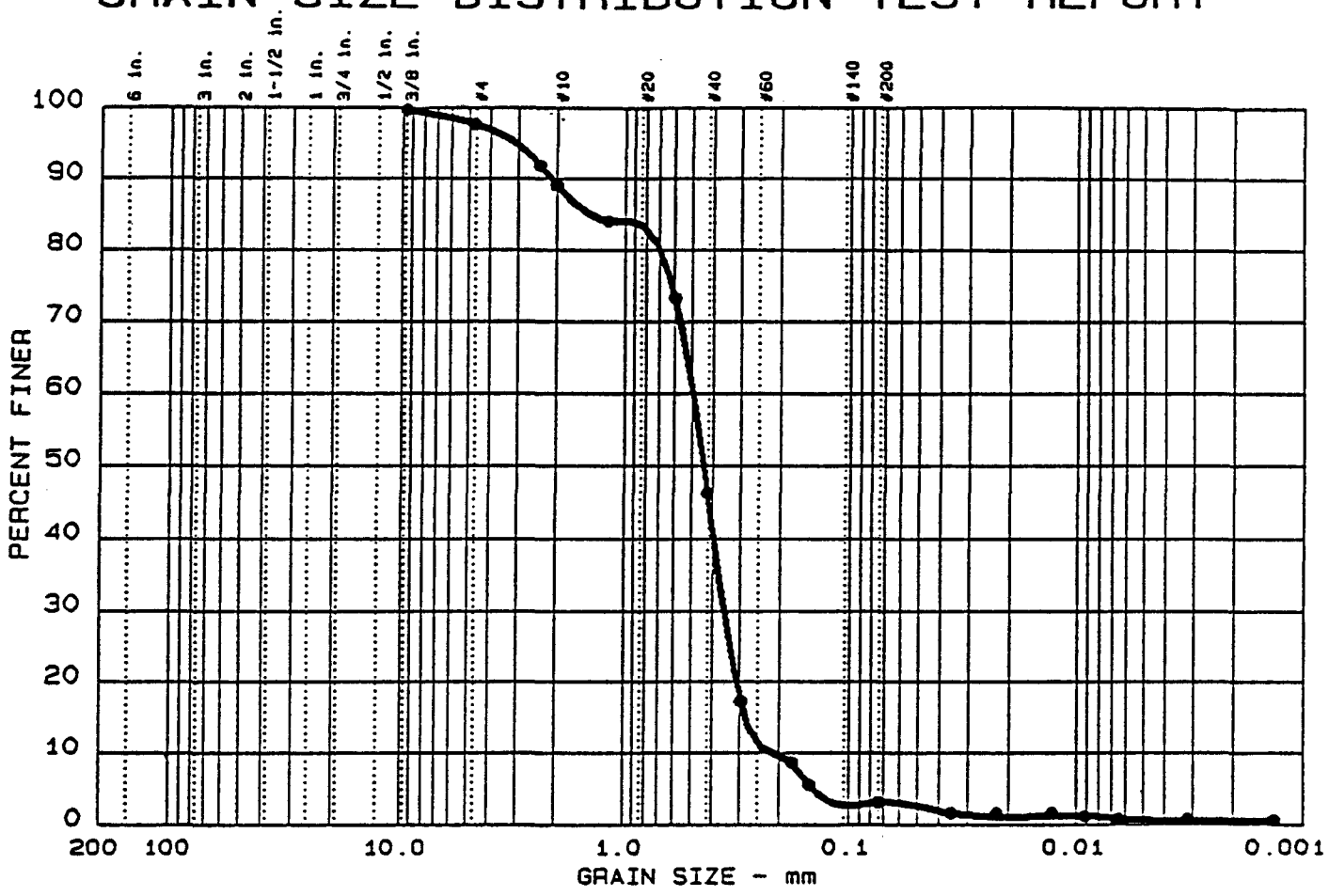
Sub-angular-Sub-rounded and hard

Figure No. 11

HD-HSC4-01

00004

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	12	0.0	2.4	94.5	2.5	0.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			1.41	0.49	0.44	0.354	0.2838	0.2178	1.17	2.2

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -22

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

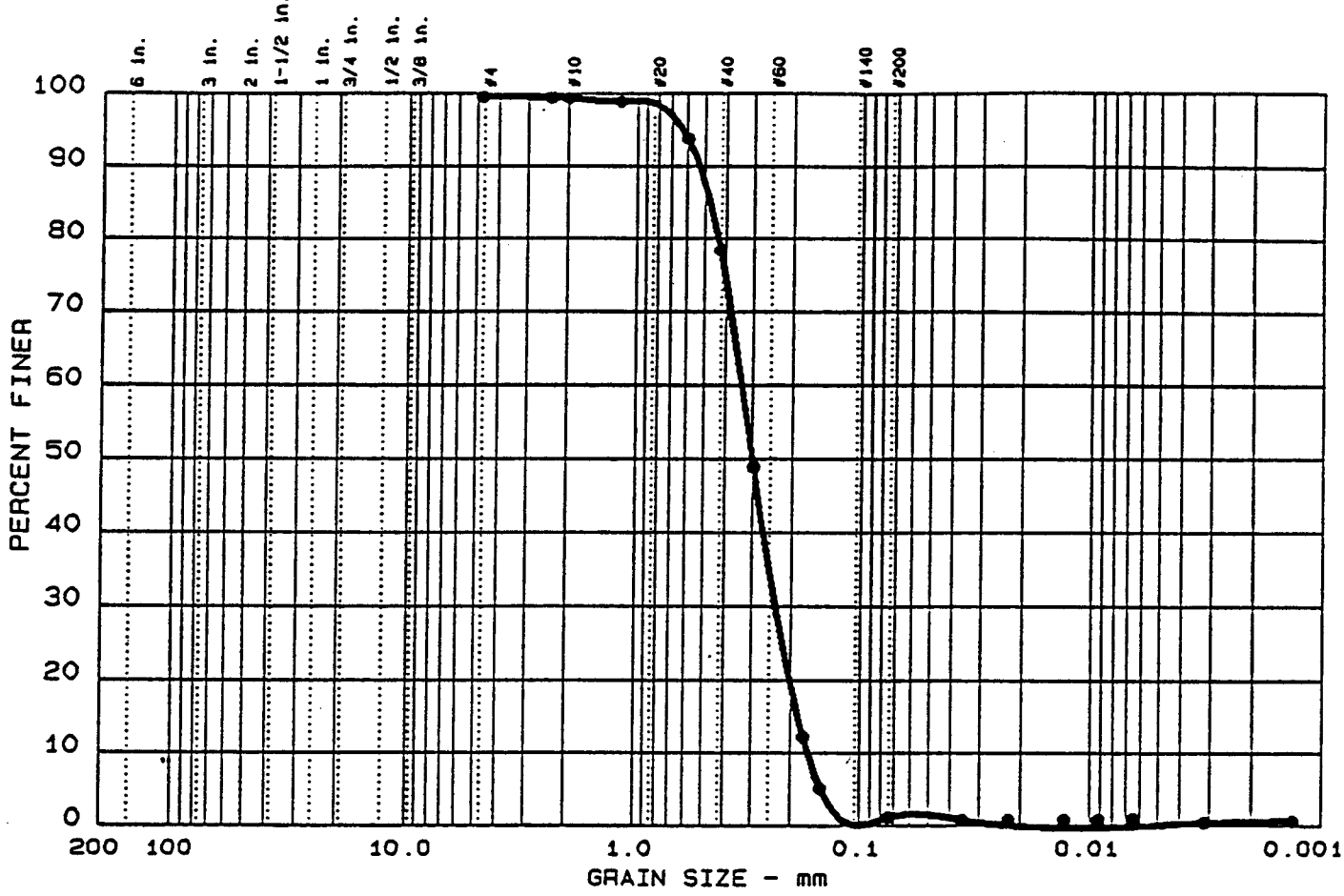
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-45065-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	13	0.0	0.6	98.2	1.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.47	0.34	0.30	0.236	0.1871	0.1694	0.98	2.0

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
◆ Location: -24

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

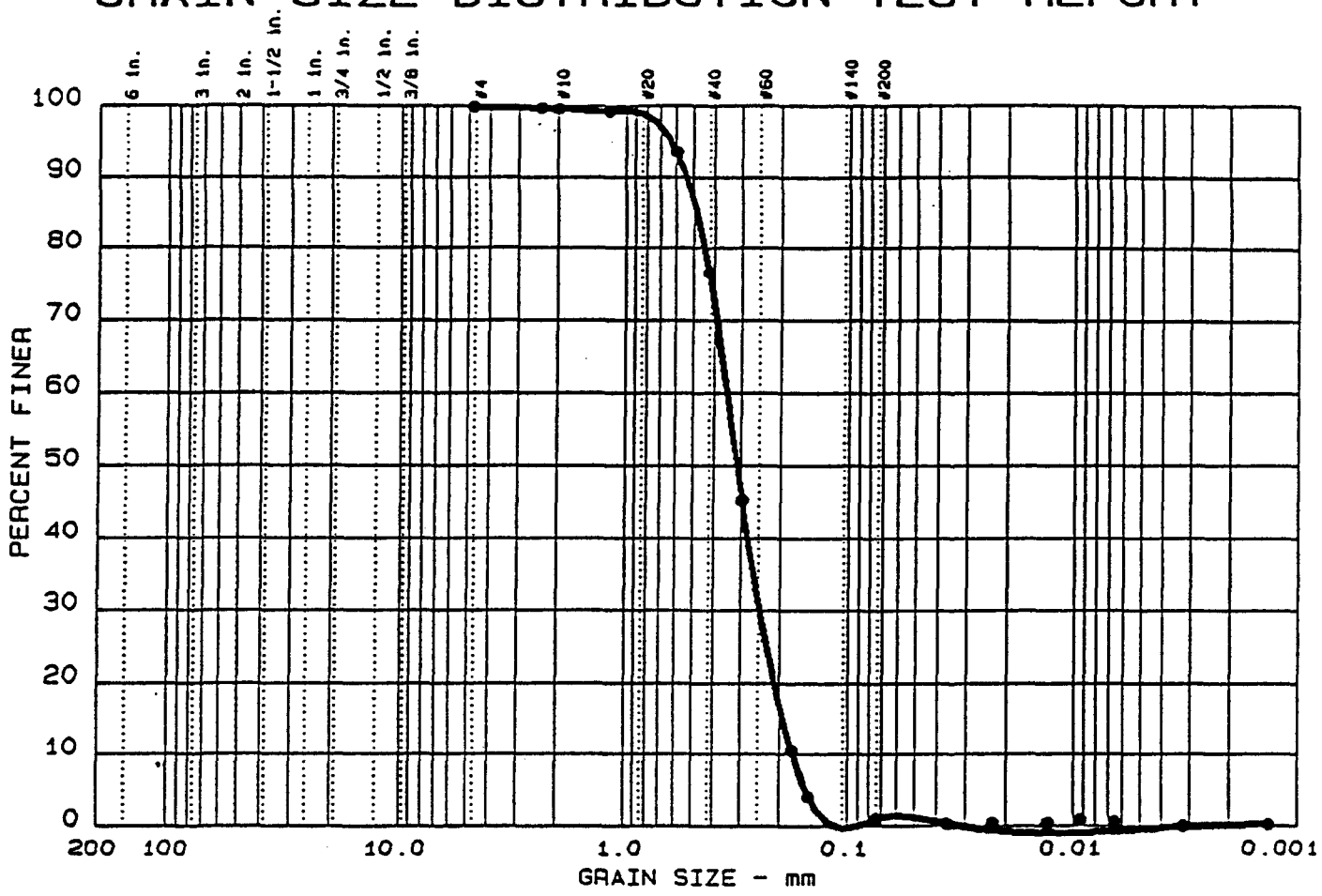
+ #10 Material:
Sub-rounded-round
and hard

Figure No.

HD-HSC4-C1 LAB. DUPLICATE

CC-30

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	14	0.0	0.3	98.8	1.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.48	0.35	0.31	0.247	0.1936	0.1746	1.00	2.0

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -24 QC

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-rounded-round
and hard

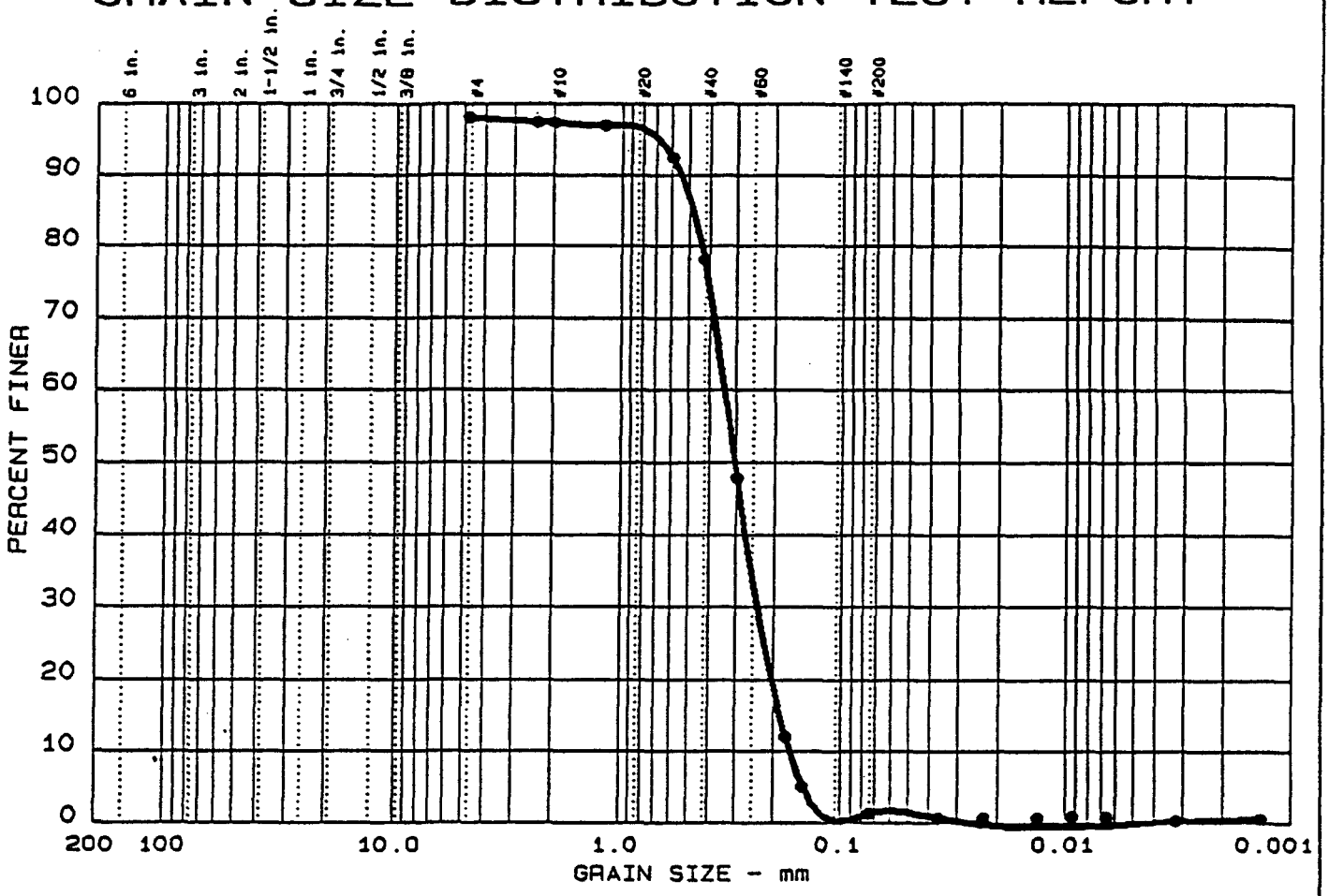
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-FDHSC5-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	2.1	96.6	1.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.47	0.34	0.30	0.238	0.1877	0.1692	0.99	2.0

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -26

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

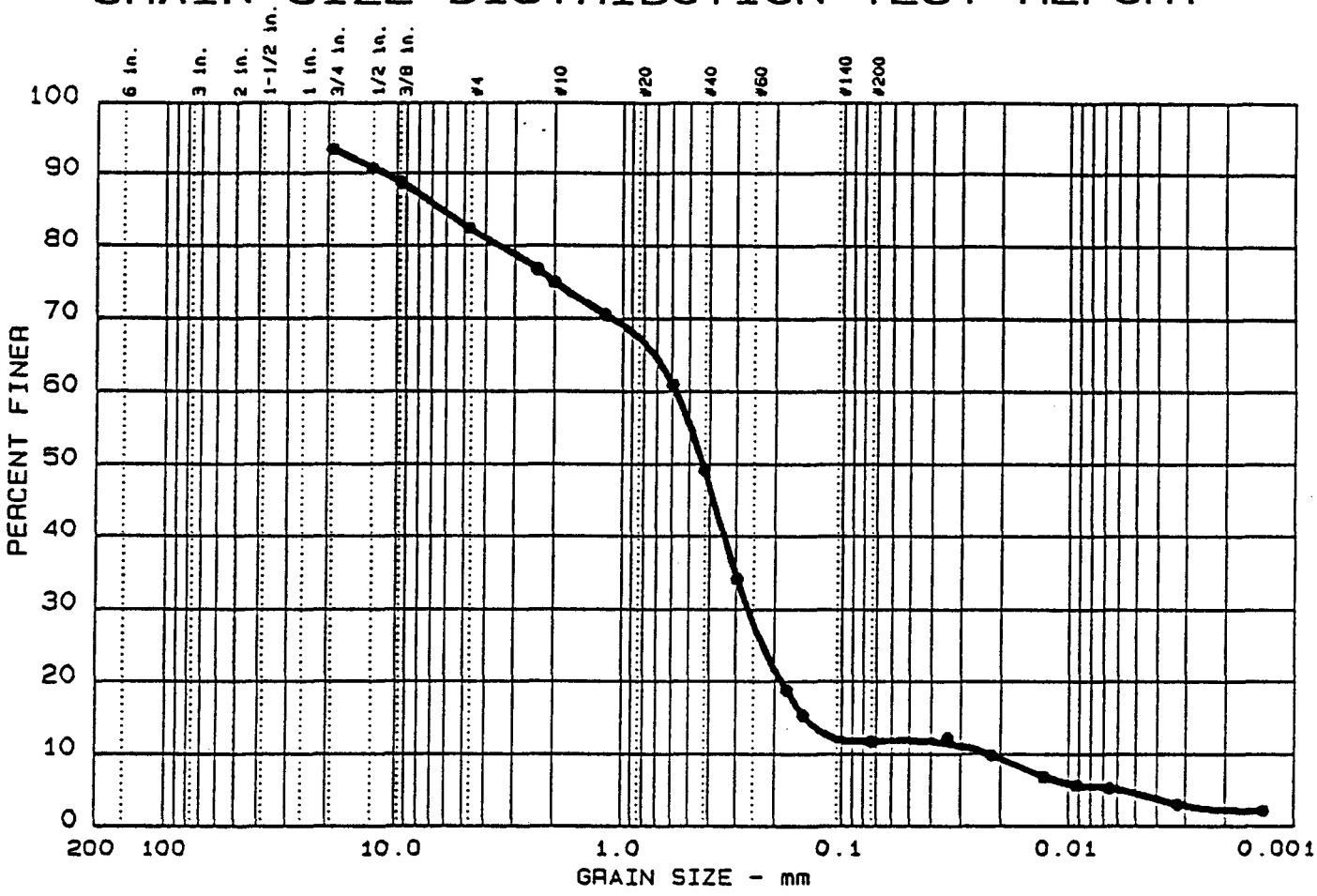
+ #10 Material:

Sub-angular-sub-rounded and hard

Figure No.

HD-TL3DS1-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	16	0.0	17.6	70.7	7.2	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			6.31	0.57	0.43	0.266	0.1464	0.0224	5.57	25.4

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -28

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-Angular, round, hard
some cinders

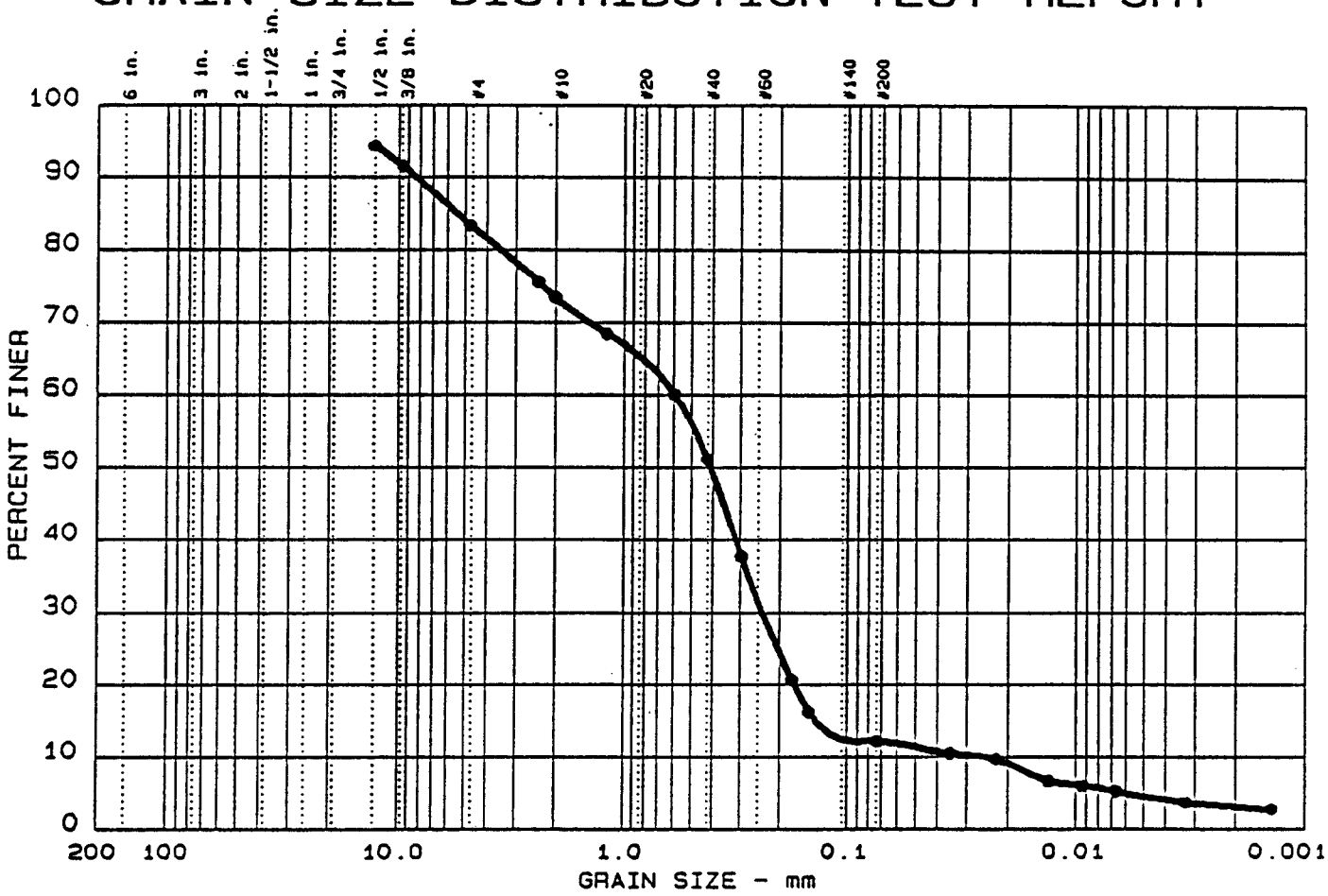
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-TL3DS2-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	16.7	71.2	7.6	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			5.43	0.59	0.41	0.240	0.1396	0.0248	3.94	23.7

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -30

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

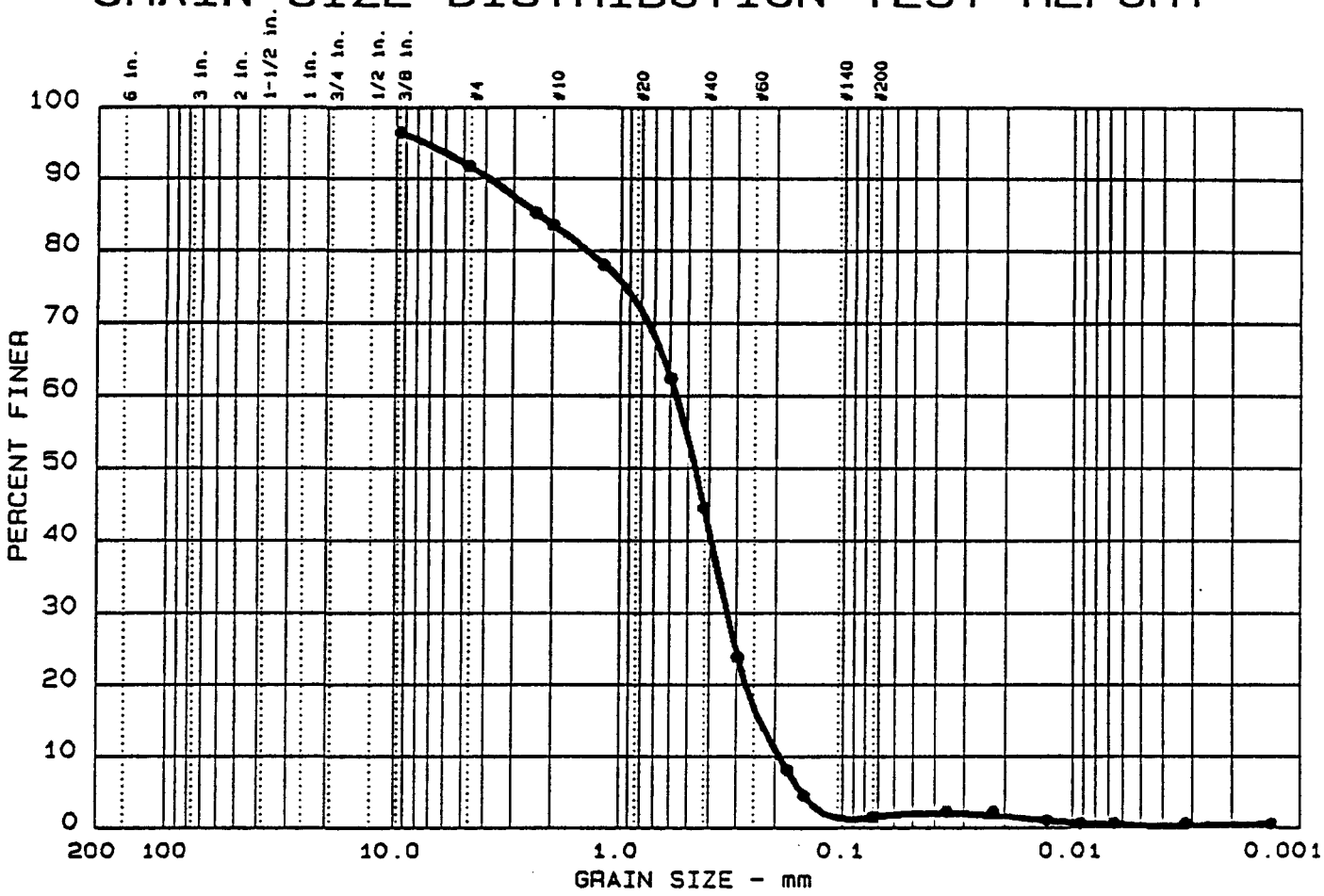
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-SD13-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	8.2	90.2	1.3	0.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			2.32	0.56	0.46	0.333	0.2355	0.1914	1.03	2.9

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -32

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

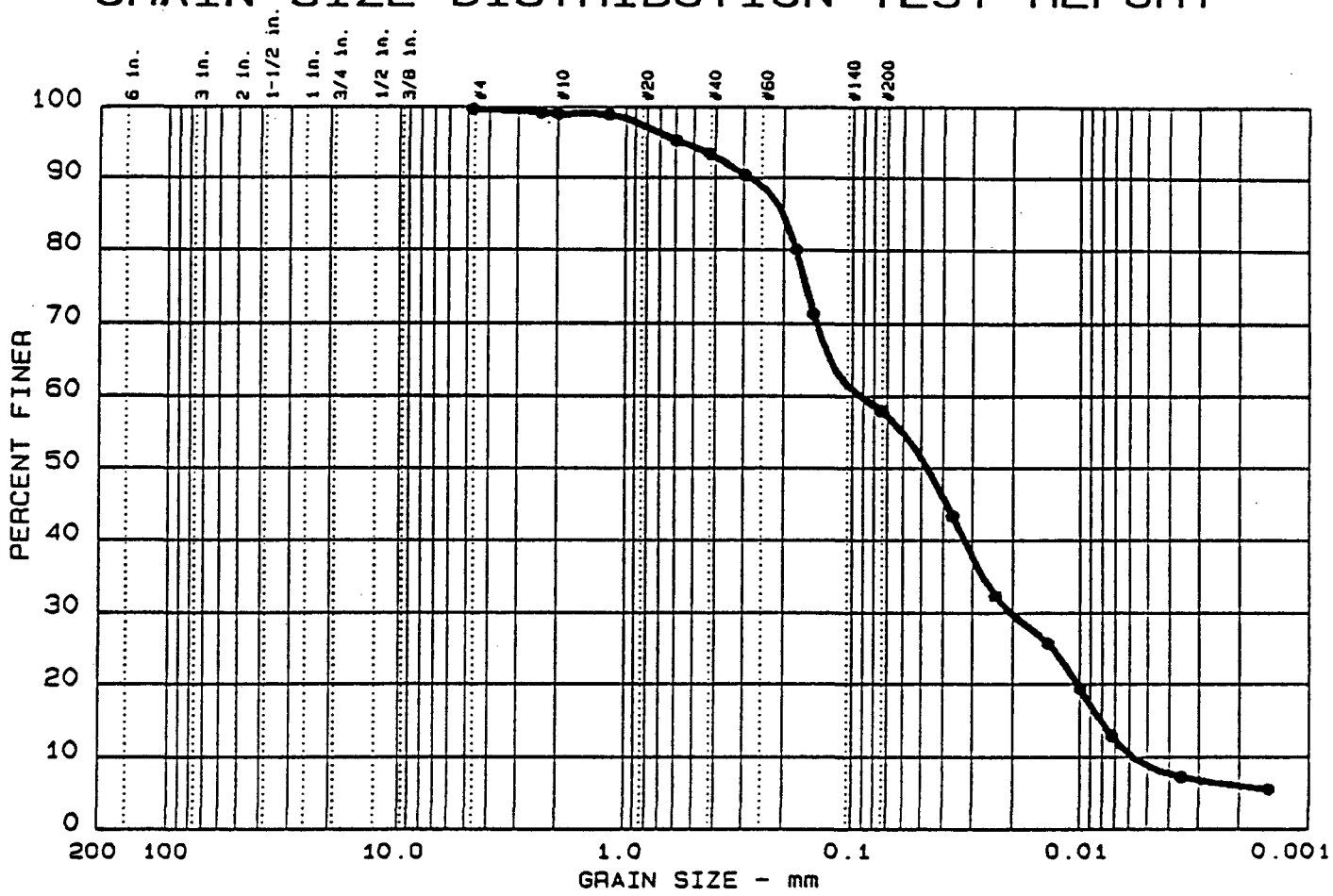
+ #10 Material:

Sub-angular-Sub-rounded and hard

Figure No.

HD - SD14 - 01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.5	41.6	49.1	8.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.20	0.09	0.05	0.020	0.0081	0.0058	0.76	16.1

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
◆ Location: -34

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

+ #10 Material:

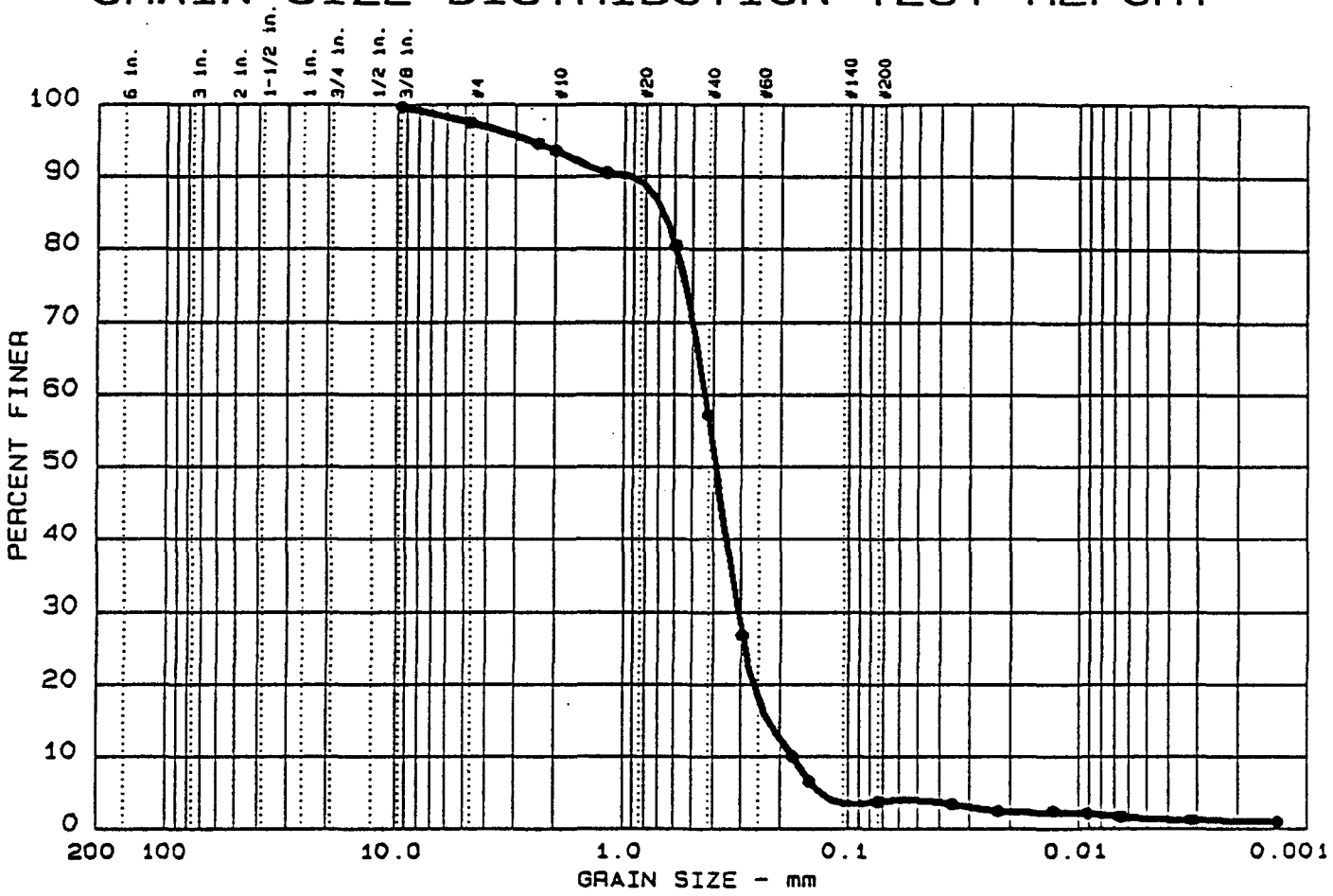
Sub-angular-Sub-rounded and hard

Figure No.

HD-SD15-01

00119

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	2.7	93.6	2.3	1.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.67	0.43	0.39	0.310	0.2265	0.1758	1.26	2.5

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -36

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

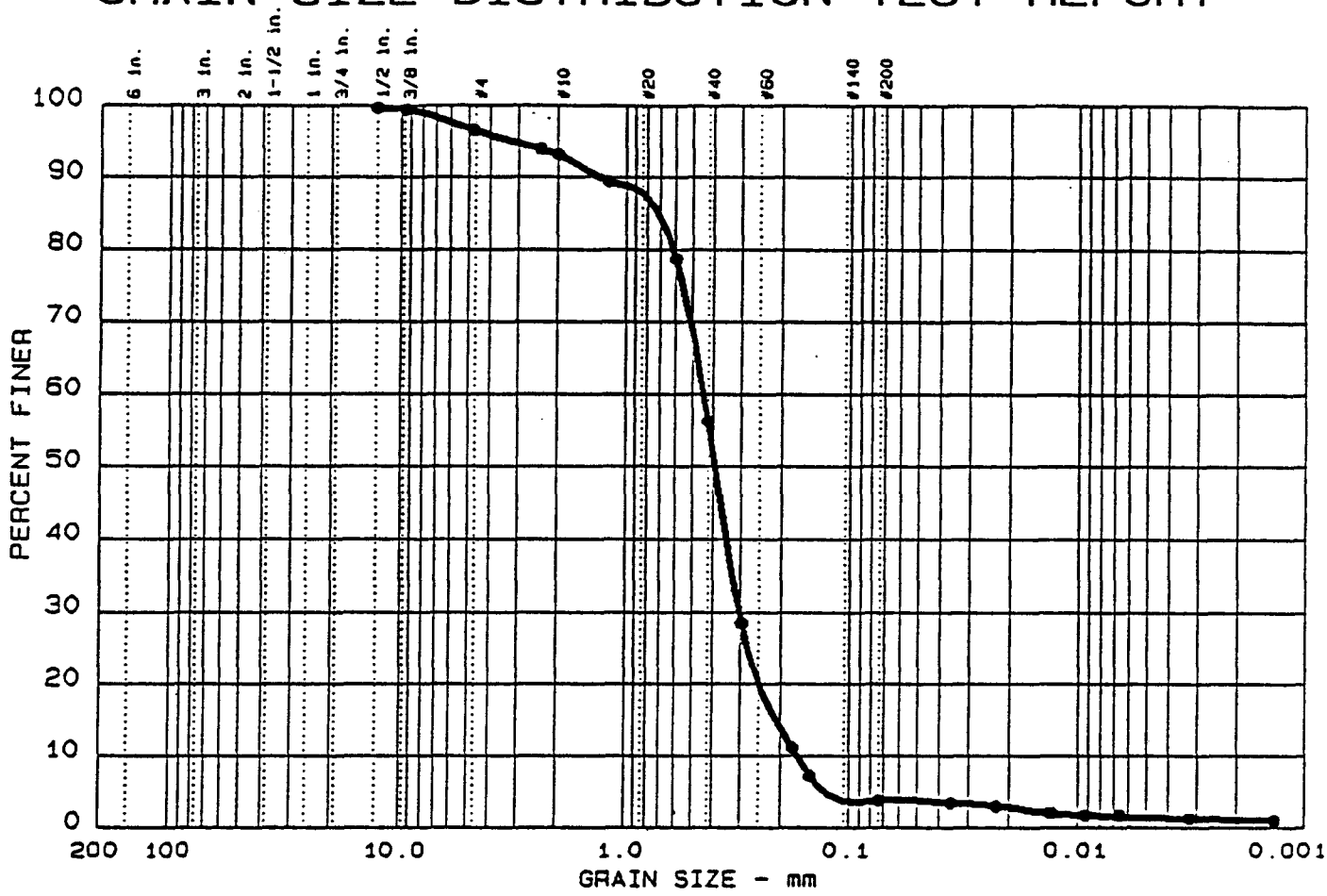
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-FD SD15-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	3.6	92.7	2.4	1.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.71	0.44	0.39	0.304	0.2104	0.1687	1.24	2.6

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -38

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

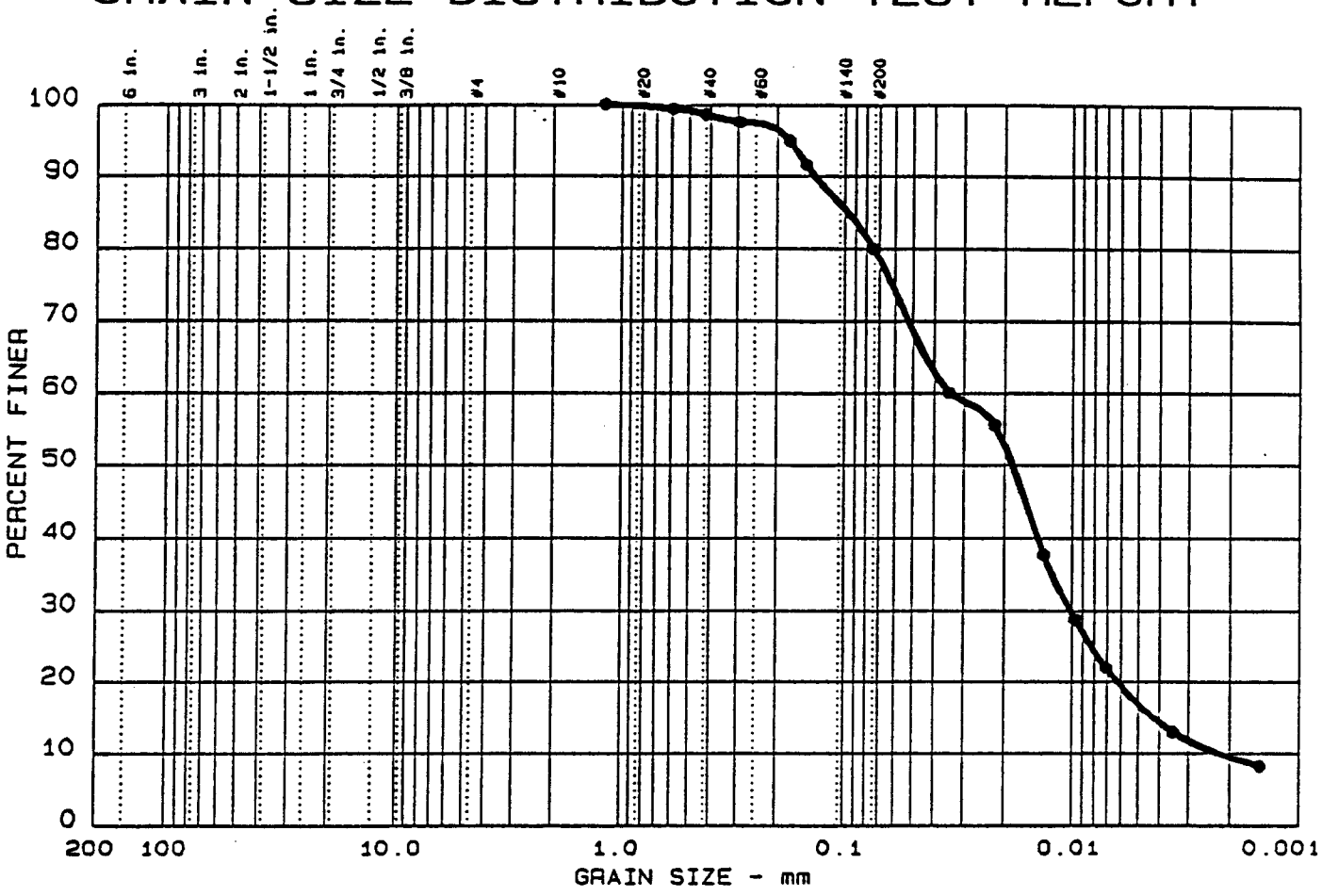
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-SD16-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	20.1	63.1	16.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.10		0.02	0.010	0.0043	0.0022	1.42	15.4

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -40

Date: 10-19-91

Remarks:

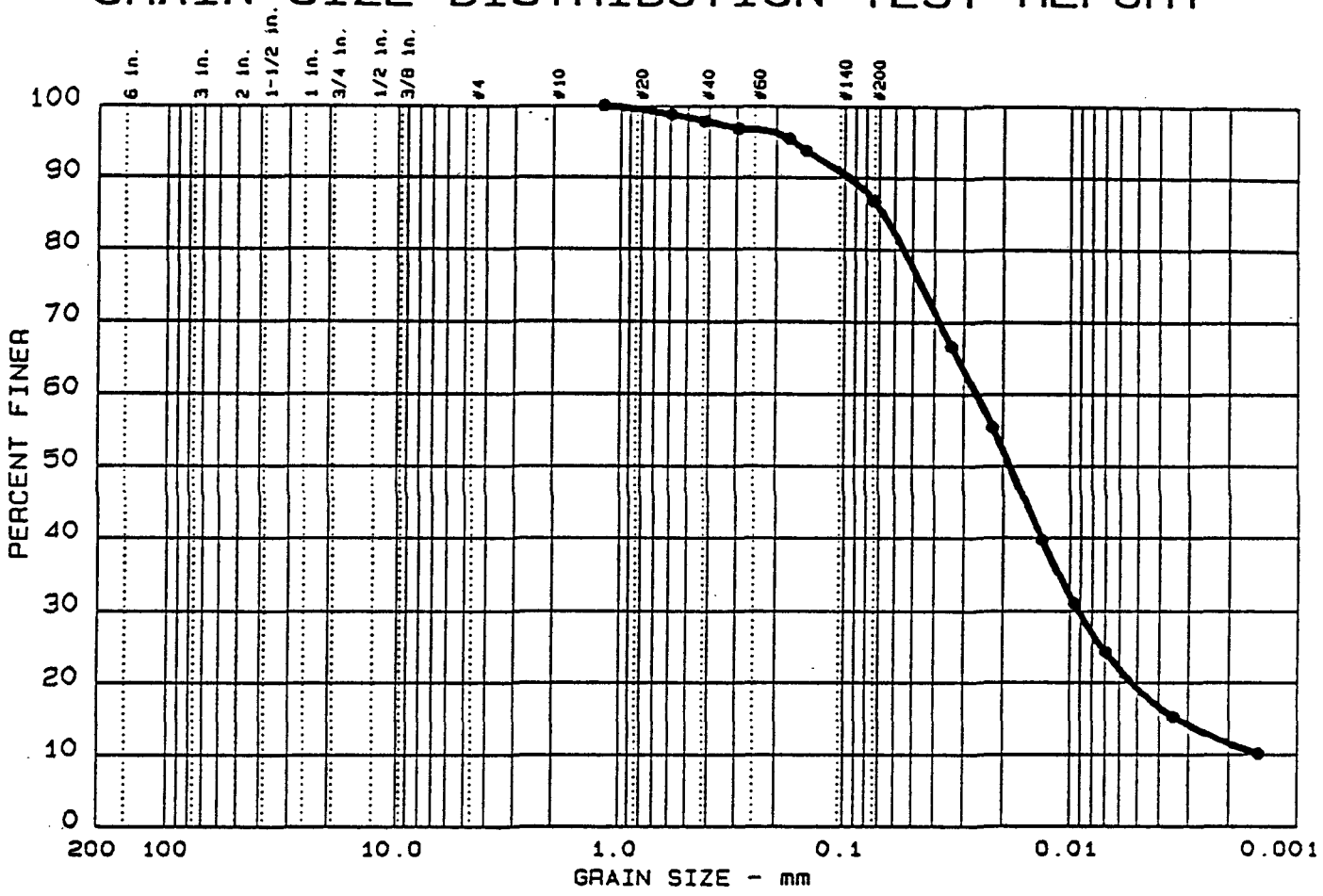
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-SD17-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	13.3	67.5	19.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●					0.02	0.009	0.0034			

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -42

Date: 10-19-91

Remarks:

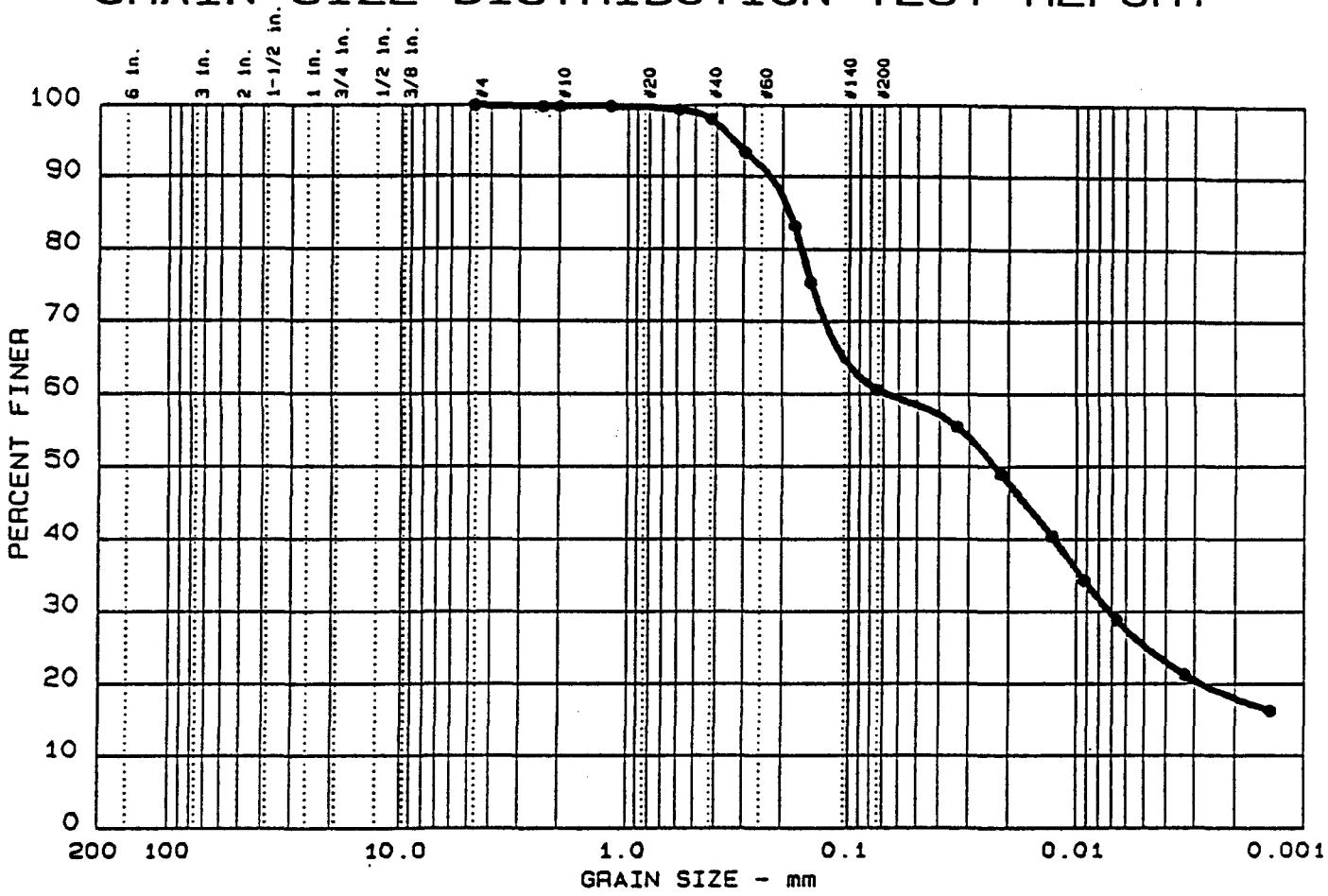
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-SD18-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.1	39.4	35.4	25.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.19		0.02	0.007				

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -44

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Subrounded
and hard

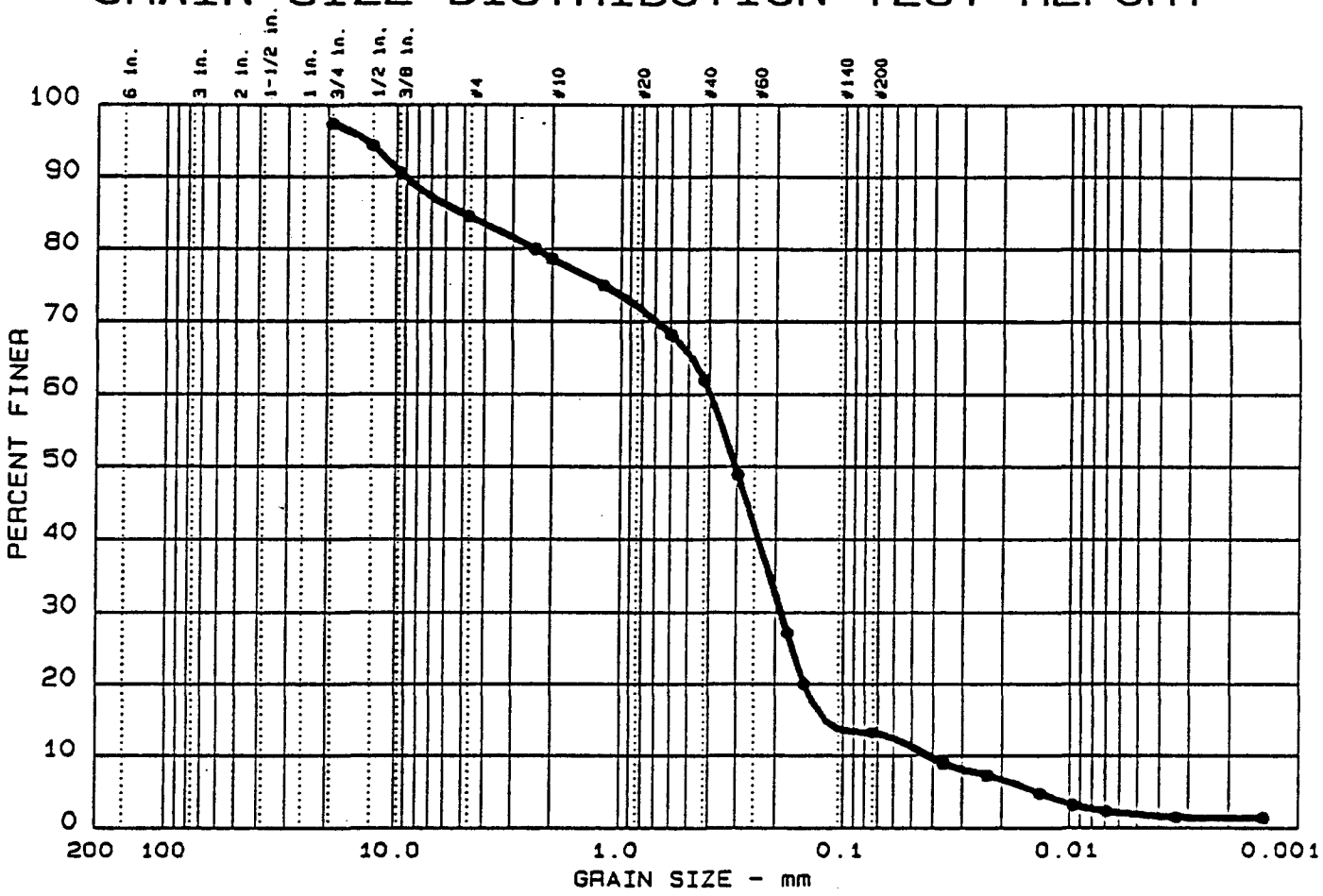
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-SD19-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	15.5	71.3	11.3	1.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			5.13	0.39	0.31	0.189	0.1194	0.0424	2.15	9.3

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -46

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

+ #10 Material:

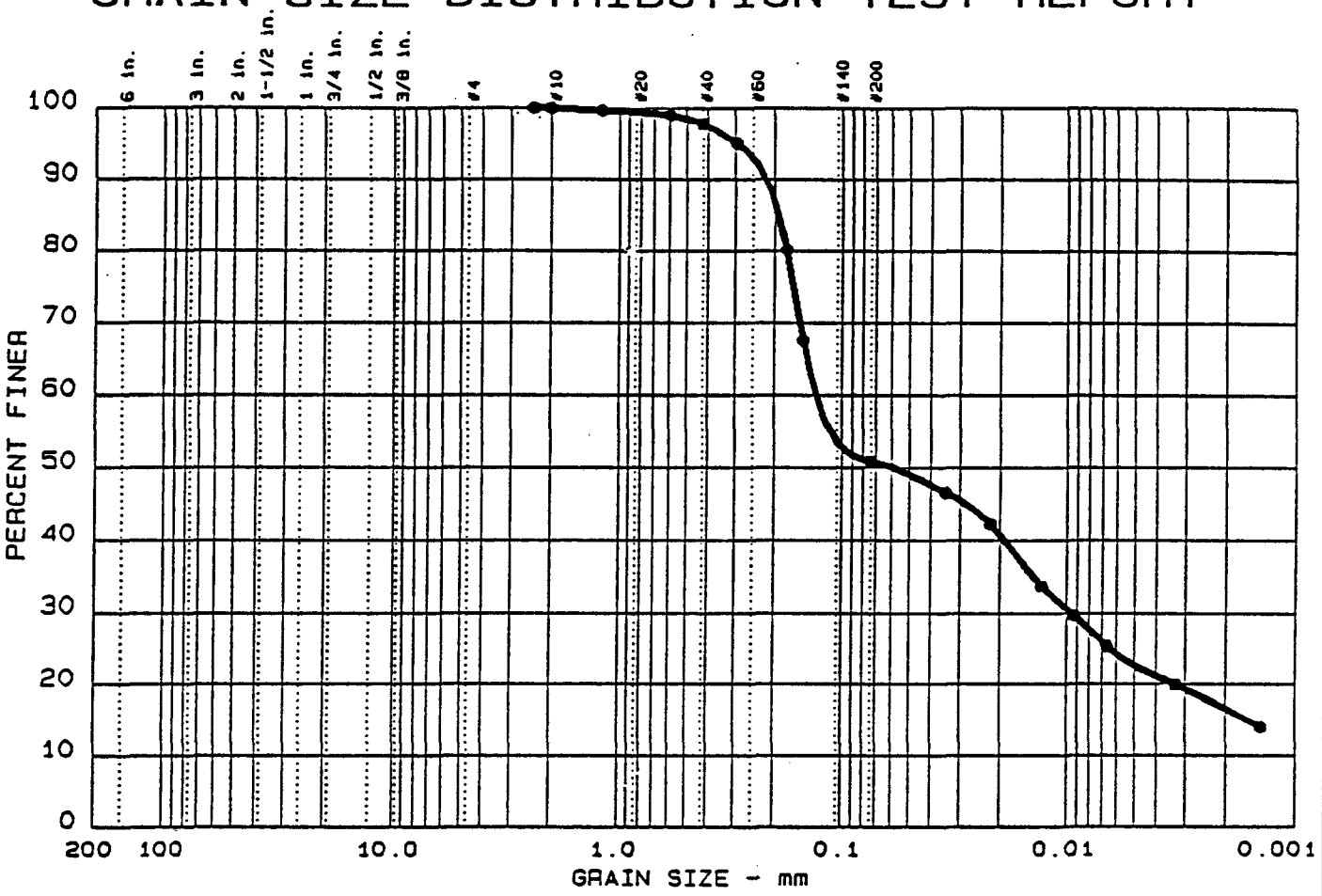
Sub-angular-Subrounded

and hard

Figure No.

HD-SD20-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	49.2	28.2	22.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.19	0.13	0.06	0.010	0.0016			

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -48

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

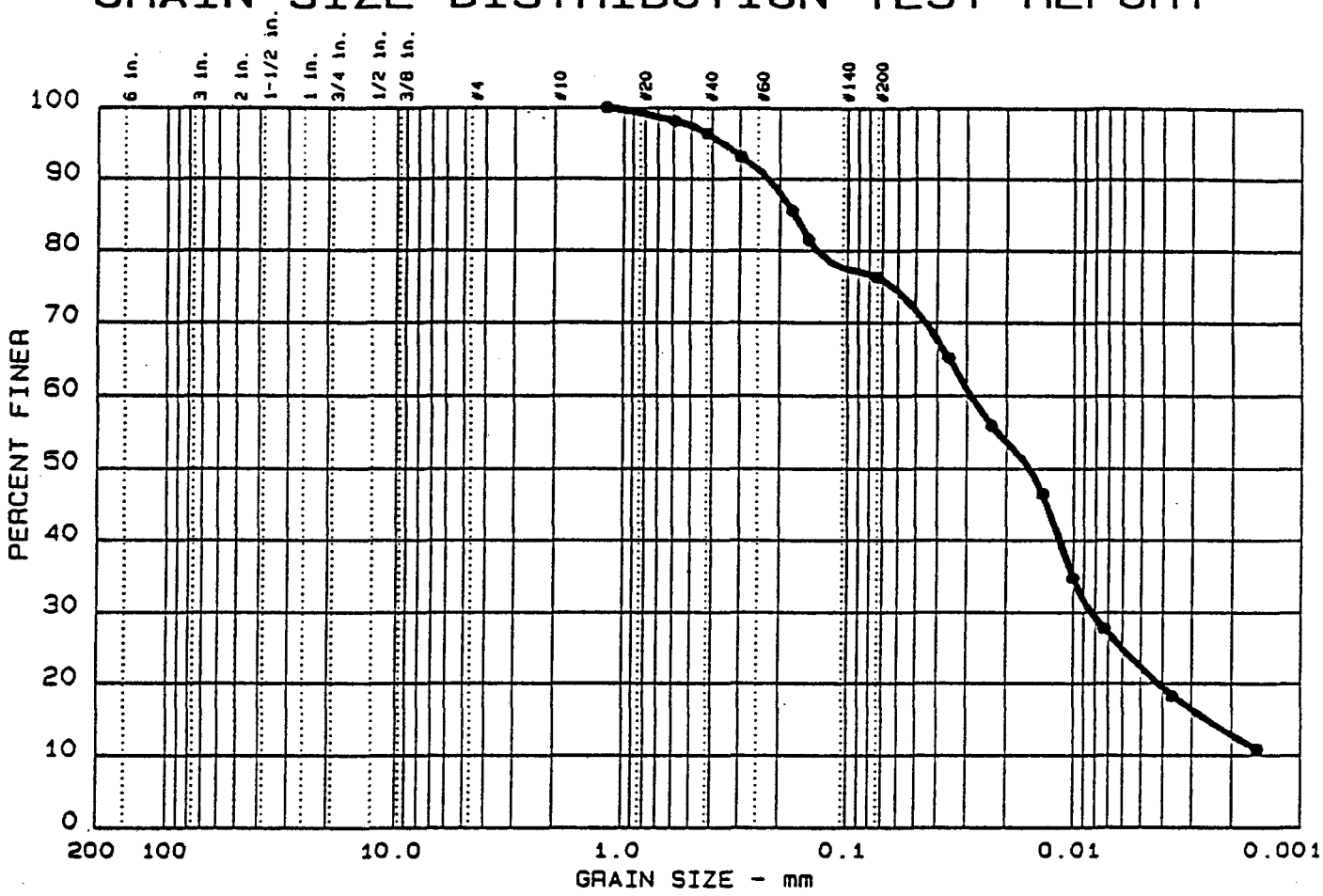
ATEC Associates, Inc.

Remarks:
+ #10 Material:
Sub-angular-Subrounded
and hard

Figure No.

HD-SD21-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	23.7	54.1	22.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●			0.17		0.02	0.008	0.0026			

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -50

Date: 10-19-91

Remarks:

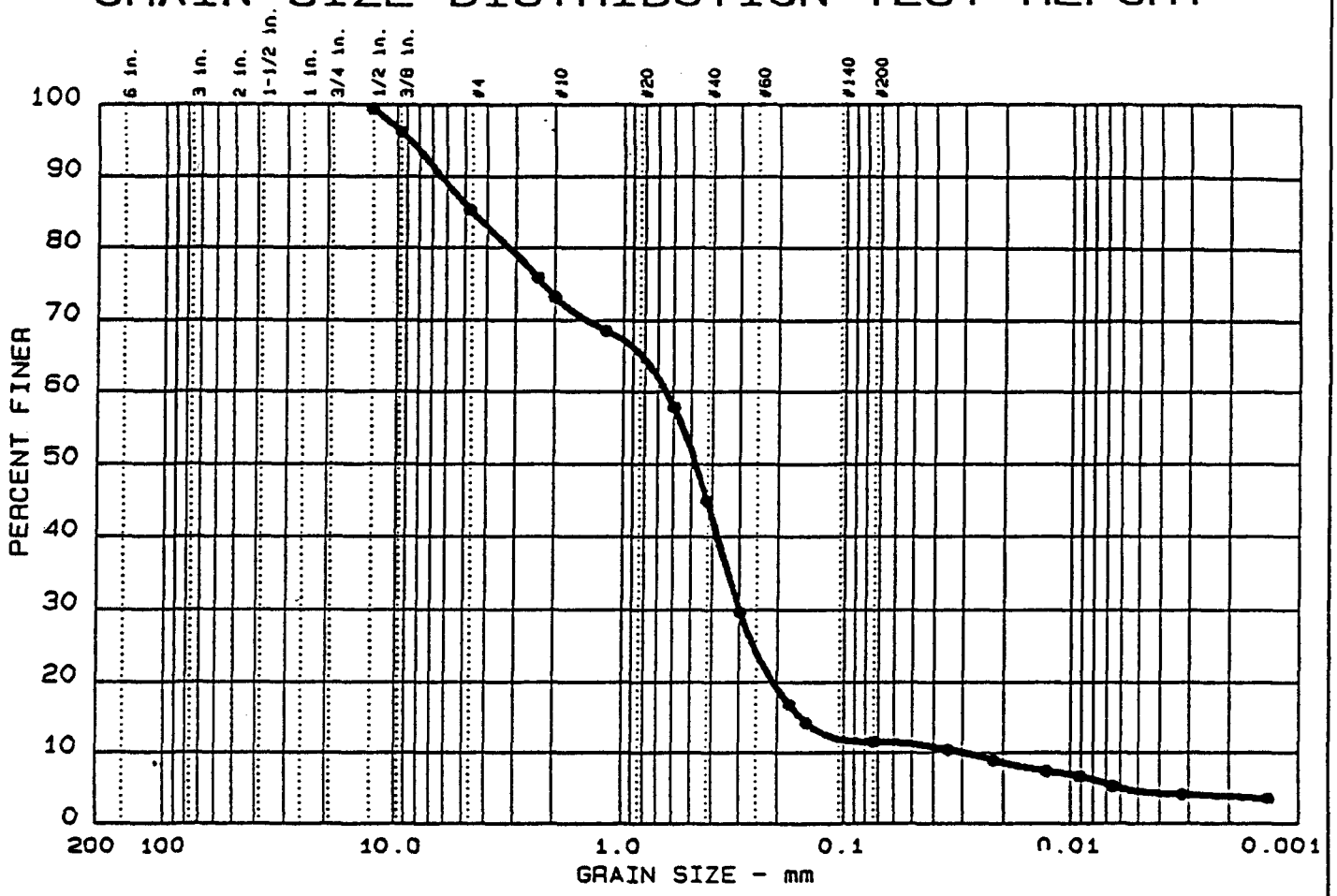
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD - HS06-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	17	0.0	14.9	73.7	6.9	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			4.68	0.64	0.47	0.301	0.1579	0.0304	4.66	21.0

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -52

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

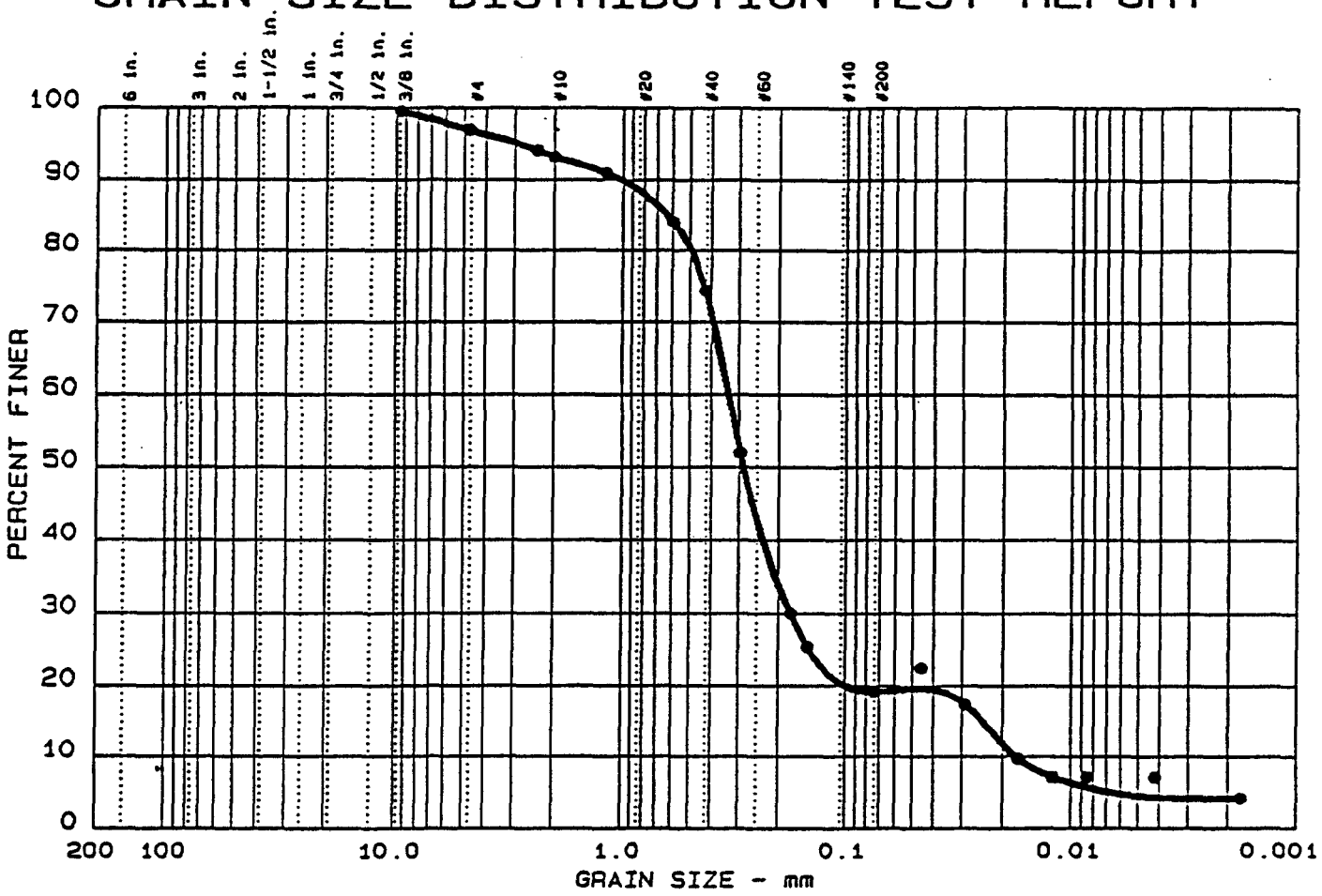
+ #10 Material:

Sub-angular, sub-round, hard, some pieces of asphalt

Figure No.

HD-HS07-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	18	0.0	3.3	77.7	14.5	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.63	0.33	0.29	0.177	0.0242	0.0173	5.42	19.3

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -54

Date: 10-19-91

Remarks:
+ #10 Material:
cinders and sticks

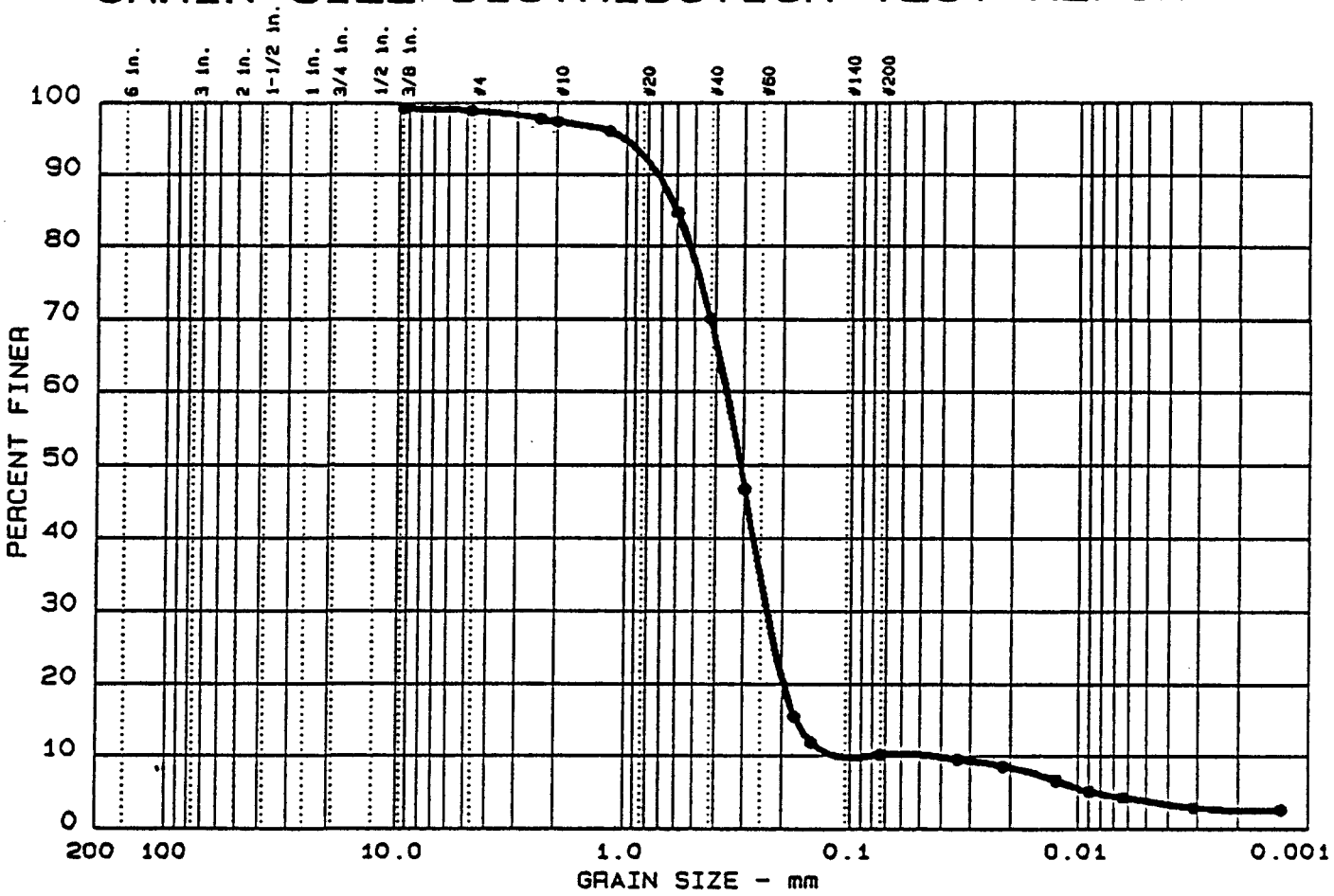
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-HS08-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	1.2	88.6	6.3	3.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.60	0.36	0.31	0.235	0.1742	0.1178	1.31	3.0

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -56

Date: 10-19-91

Remarks:

+ #10 Material:

Sub-angular-Sub-rounded and hard

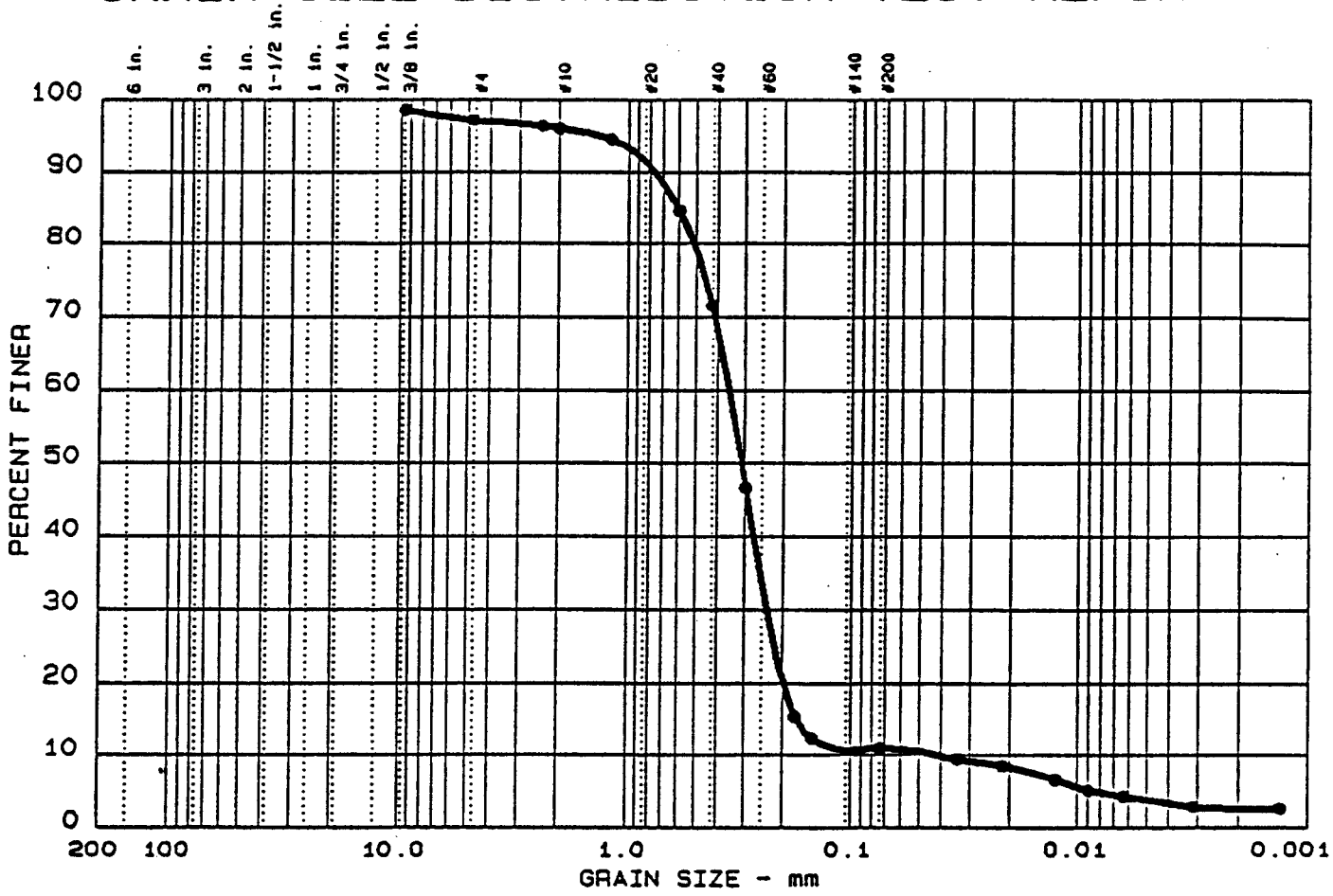
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-HSCS-01 LAB. DUPLICATE

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	3.0	86.1	7.2	3.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.60	0.35	0.31	0.237	0.1752	0.0415	3.84	8.5

MATERIAL DESCRIPTION	USCS	AASHTO
●		

Project No.: 21-12392
Project: SAS 6728-E
● Location: -56 QC

Date: 10-19-91

Remarks:
+ #10 Material:
Sub-angular-Sub-rounded
and hard

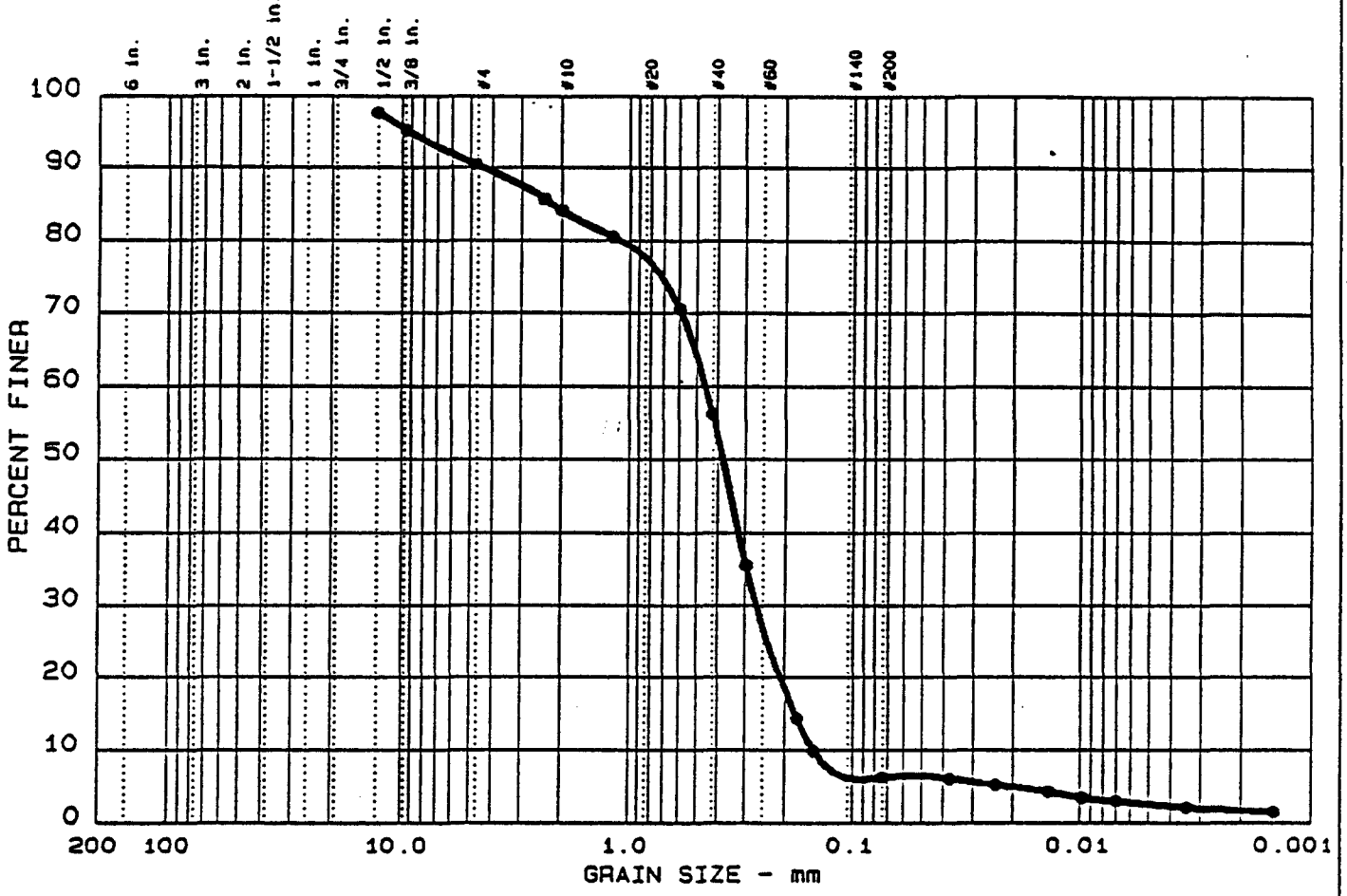
GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Figure No.

HD-HS09-01

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	9.6	84.2	3.7	2.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			2.21	0.45	0.38	0.267	0.1807	0.1503	1.05	3.0

	MATERIAL DESCRIPTION	USCS	AASHTO
●			

Project No.: 21-12392
Project: SAS 6728-E
● Location: -58

Date: 10-19-91

GRAIN SIZE DISTRIBUTION TEST REPORT

ATEC Associates, Inc.

Remarks:

+ #10 Material:

Sub-angular-Subrounded

and hard

Figure No.

APPENDIX C

TECHNICAL EVALUATION MEMORANDA

TECHNICAL EVALUATION MEMORANDUM NO. 1

DATE: March 15, 1992

TO: Mehdi Geraminegad, Site Manager

FROM: Steve Padovani - RI Lead

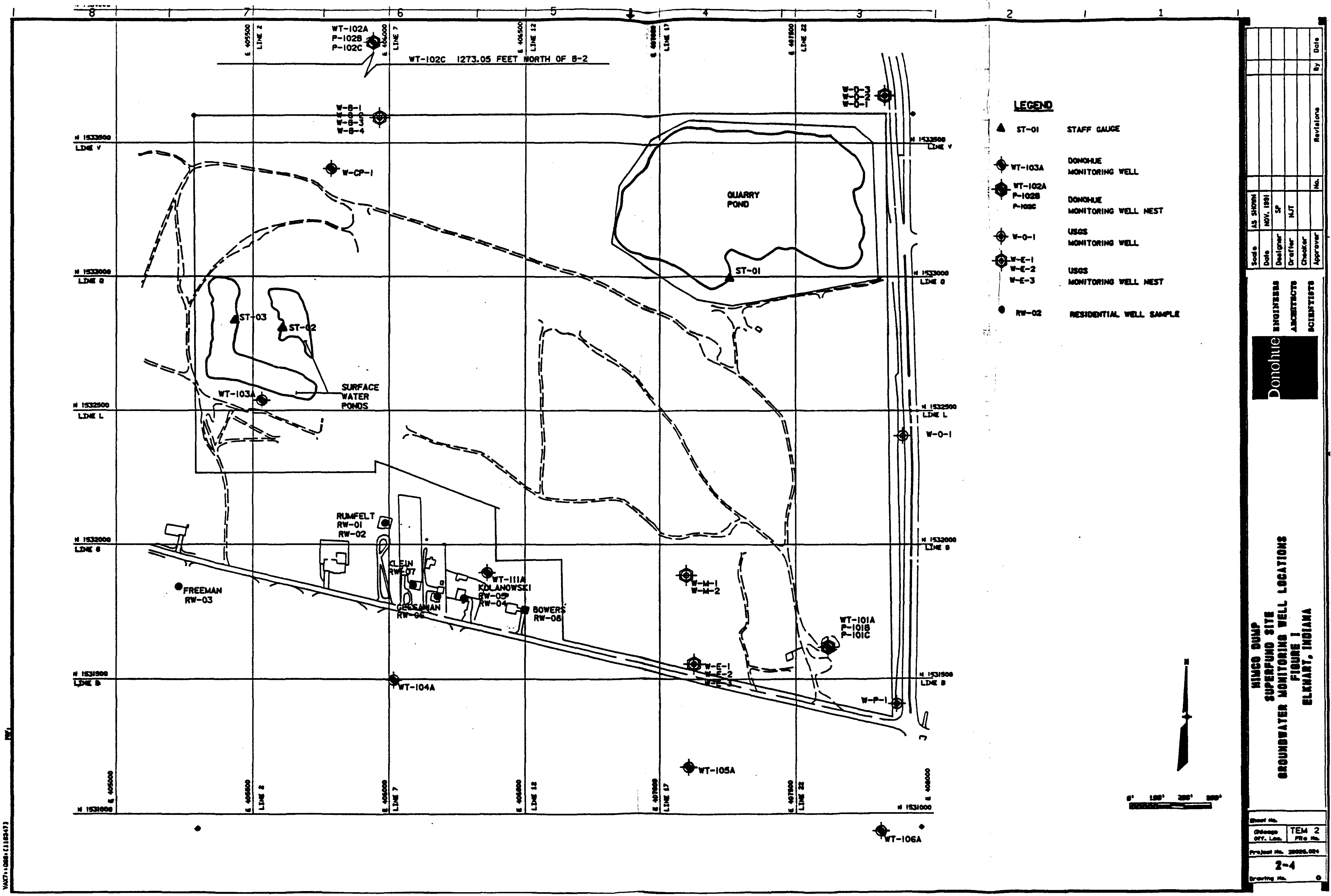
SUBJECT: EPA Region V ARCS Contract No. 68-W8-0093
EPA Work Assignment No. 17-5L4J
Donohue Project No. 20026
Himco Dump RI/FS

Hydrogeologic Evaluation
Himco Dump Superfund Site
Elkhart, Indiana

INTRODUCTION

As a part of the Remedial Investigation (RI), a site-specific hydrogeologic investigation was conducted at the Himco Dump Superfund site. The RI field program was conducted in two phases. Phase I was conducted from October 1990 through February 1991. Phase II was conducted during September and November 1991.

This memorandum presents the results and interpretations of the site-specific hydrogeologic investigation. The site-specific hydrogeologic investigation included determining aquifer permeabilities and transmissivities, vertical and horizontal groundwater flow gradients, flow direction, and the potential hydraulic connections between the three surface water bodies and groundwater flow. The hydrogeologic investigation included 13 groundwater monitoring well installations, three staff gauge installations, in-field hydraulic conductivity tests, and monitoring well water level measurements. The monitoring well installation included seven water table, two intermediate, and two deep wells all monitoring the same aquifer. The intermediate and deep monitoring wells are part of the well nests located at the northwest and southeast corners of the site. Each well nest consists of one water table well, one intermediate well and one deep well. Monitoring well and staff gauge locations are presented in Figure 1. Monitoring well installation procedures are presented in TM1, TM13, and TM19. Monitoring well installation diagrams are included in Attachment A. Staff gauge installation procedures are presented in TM6. In-field hydraulic conductivity testing is documented in TM11 and TM26. Water level measurements are documented in TM28.


LEGEND
ST-01 STAFF GAUGE
WT-103A DONOHUE MONITORING WELL
WT-102A P-102B P-102C DONOHUE MONITORING WELL NEST
W-O-1 USGS MONITORING WELL
W-E-1 W-E-2 W-E-3 USGS MONITORING WELL NEST
RW-02 RESIDENTIAL WELL SAMPLE
WT-102C 1273.05 FEET NORTH OF B-2
QUARRY POND
SURFACE WATER PONDS
ST-01
ST-02
ST-03
W-CP-1
WT-103A
W-O-1
RUMFELT RW-01 RW-02
KLEIN RW-07
FREEMAN RW-03
KOLANOWSKI RW-05 RW-04
BOWERS RW-08
WT-111A
W-M-1 W-M-2
WT-101A P-101B P-101C
W-E-1 W-E-2 W-E-3
W-P-1
WT-104A
WT-105A
WT-106A
LINE V
LINE Q
LINE L
LINE G
LINE B
LINE 2
LINE 7
LINE 12
LINE 17
LINE 22
HIMCO DUMP SUPERFUND SITE
GROUNDWATER MONITORING WELL LOCATIONS
FIGURE 1
ELKHART, INDIANA
Donohue ENGINEERS ARCHITECTS SCIENTISTS
Scale AS SHOWN
Date NOV. 1991
Designer SP
Drafter NJT
Checker
Approver
No. Revisions By Date
TEM 2
2-4

SUMMARY OF RESULTS

Groundwater flow interpreted from the site investigation at the Himco site appears to be consistent with the regional groundwater flow direction. Regional conditions indicate a groundwater flow direction to the south-southeast. At the Himco site groundwater flows south-southeast with low vertical and horizontal gradients. Groundwater flow patterns appear to be seasonally consistent. Hydraulic conductivities ranged from 1.2×10^{-1} cm/s to 7.95×10^{-4} cm/s. Differences in hydraulic conductivities indicate the inhomogenuity of the aquifer at the Himco site. Inhomogenuity conditions may exist due to the nature of the geologic deposits. The horizontal hydraulic gradient was estimated to be 1.6×10^{-3} ft/ft. Estimated vertical gradients ranged from an upward vertical gradient of 1.0×10^{-3} ft/ft to a downward vertical gradient of 3.5×10^{-4} ft/ft. However, vertical gradients are predominately upward. Groundwater flow velocity across the site was estimated to be 3.85×10^{-6} ft/s (.33 ft/day), or 121 ft/yr. Groundwater flow velocity was determined using an effective porosity of 0.30, a hydraulic gradient of 1.6×10^{-3} ft/ft, and an average hydraulic conductivity of 2.2×10^{-2} cm/s. The water table at the site occurs between 5 and 17 feet below ground surface. The maximum groundwater fluctuations observed at the site during November 1990 and October 1991 was 1.17 feet.

The three surface water bodies represent the surface expression of the water table in this area. Groundwater flow patterns around the ponds indicate the ponds act as flow-through ponds.

There is evidence of groundwater contamination at the Himco site. Heavy metal contamination was found during Phase I field activities in wells located along the south end and downgradient of the site. These wells included two residential wells no longer in use, and one USGS monitoring well. Site-specific hydrogeologic information may be important to understanding contaminant fate and transport at the Himco site. Specifically, three groundwater characteristics may be important in controlling groundwater contaminant migration. These include the relatively flat horizontal gradients, upward vertical gradients, and fluctuations in water table levels. Because the horizontal gradient is relatively flat, even a small amount of pumping may change the flow direction. Residents to the east of the dump are presently using private wells. Because of consistent upward vertical gradients, contamination is less likely to be carried downward to deep wells. In addition, upward vertical gradients indicate that nearby residential wells are not likely affecting groundwater flow in the shallow groundwater directly beneath the site. Water table fluctuations may be important because the water table is relatively near the contaminant source. During relatively high water table episodes, groundwater may have a relatively higher potential to interact with and increase leaching from the contaminant source. This could result in a more rapid mechanism by which contamination from the dump can enter the groundwater system.

HYDROGEOLOGIC INTERPRETATION AND ANALYSIS

Regional Hydrogeology

The Elkhart County area is underlain by an extensive, thick outwash aquifer composed of sand and gravel. In some parts of the area, there is a silt and clay layer which acts as an aquitard. This confining layer, where present, divides the outwash aquifer into an upper unconfined aquifer and a lower confined aquifer. However, this confining layer is not present under the Himco site. The Paleozoic rocks (principally shales) below the outwash aquifer generally act as aquitards and are not used as a source of groundwater. According to the Indiana Geological Survey Division of Water, it is very rare to have wells screened in the bedrock and there are no records of any high capacity wells in these formations near the Himco site. The saturated thickness of the outwash aquifer ranges from 40 feet in a bedrock pick to more than 500 feet in a preglacial bedrock valley. The bedrock valley trends northeast-southwest and occurs directly below the Himco Dump site. Regional groundwater recharge is from north of the Elkhart County area and from ground surface infiltration. The St. Joseph River is a regional groundwater discharge area. Groundwater generally flows south-southeast towards the St. Joseph River. Groundwater flow is generally horizontal in areas away from the St. Joseph River, but upward gradients were found in areas near the river (USGS, 1981). The Himco Dump site is located approximately 1.5 miles north of the St. Joseph River.

Based on our knowledge of regional groundwater flow, site-specific groundwater flow is expected to be generally horizontal and in a south-southeast direction towards the St. Joseph River.

The following interpretation of groundwater flow at the Himco site includes only the upper 200 feet (approximately) of the outwash aquifer. This is due to limited information below approximately 200 feet. However, the upper 200 feet of the outwash is the aquifer portion of primary concern at the Himco site.

Site-Specific Hydrogeology

Groundwater flow at the Himco Dump Superfund site is controlled by regional flow in the areas. The outwash deposits at the site extends from ground surface to a depth of 174 to 489 feet below ground surface. These deposits are comprised of poorly to well graded sands and gravels, and gravel-sand-silt mixtures. Minor seams of silt and clay exist primarily in the northwest and southeast corners of the site, but there was no indication of a consistent layer beneath the site which may be considered a confining unit. Underlying the outwash deposits are the Coldwater and Ellsworth shale of Mississippian Age. The shale below the outwash aquifers generally acts as an aquifer and are not used as a source of groundwater.

Hydraulic Conductivity

In-situ hydraulic conductivity tests (slug tests) were conducted to measure aquifer hydraulic conductivities (K). Slug tests were conducted on the wells installed during the RI and selected United States Geological Survey (USGS) wells. Both rising and falling head slug tests were conducted. Procedures for slug testing are presented in TM11 and TM26.

The results of hydraulic conductivity estimation using the Bower and Rice method are summarized in Table 1. Hydraulic conductivity values ranged between $1.2x10^{-1}$ cm/s to $7.9x10^{-4}$ cm/s, with an average value of $2.2x10^{-2}$ cm/s. These values fall within hydraulic conductivity values for silty sand, clean sand, and gravel. In general, permeability measured in shallow wells ($1.2x10^{-1}$ cm/s to $9.4x10^{-3}$ cm/s) were higher than those measured in intermediate and deep wells ($3.9x10^{-3}$ cm/s to $7.9x10^{-4}$ cm/s). Estimated hydraulic conductivity values from the RI wells display a narrow range, between $1.9x10^{-2}$ cm/s and $7.8x10^{-3}$ cm/s with an average value of $2.2x10^{-2}$ cm/s. The USGS wells display a wider range in hydraulic conductivity values ($1.21x10^{-1}$ cm/s to $7.95x10^{-4}$ cm/s), but display the same average value ($2.34x10^{-2}$ cm/s). Differences in hydraulic conductivities indicate the possibility of inhomogenuity conditions in the aquifer.

Groundwater Flow

Groundwater elevations were measured on February 1 and 2, 1991 (Phase I) and on November 19, 1991 (Phase II). These data were used to plot the groundwater contour maps shown in Figures 2 and 3. The following discussion is primarily based on phase II data because: 1) more well measurements were collected during Phase II (13) than those collected during Phase I (10), and 2) Surface water levels were measured in the three surface water bodies during Phase II. Surface water levels could not be measured during Phase I because all three surface water bodies were frozen.

1. Gradients

The average horizontal groundwater gradient was approximately $1.5x10^{-3}$ ft/ft. This value was based on water level elevation differences between wells B-3 and WT104A. The average horizontal groundwater gradient estimated from Phase I data was approximately $1.7x10^{-3}$ ft/ft.

Information concerning vertical gradients was collected during Phase I and II of the RI using nested wells installed in the northwest (WT102A, P102B, and P102C) and southeast (WT101A, P101B, and P101C) corners of the site. The midpoint of the screened intervals was used to determine the depth interval between respective water table wells and intermediate and deep piezometers for gradient calculations. Table 2 summarizes Phase I and II vertical gradients.

TABLE 1

SUMMARY OF FIELD HYDRAULIC CONDUCTIVITY TESTS
HIMCO DUMP SUPERFUND SITE
Elkhart, Indiana

Well Number	Hydraulic Conductivity (cm/s)	Bottom of Well Elevation	Soil Class Well Screened In
M1-RISE	$3.1x10^{-3}$	667.08	SP, GP
M1-FALL	$1.4x10^{-3}$	667.08	SP, GP
F1-RISE	$1.2x10^{-1}$	31.28 **	*
F1-FALL	$4.5x10^{-2}$	31.28 **	*
F2-FALL	$1.2x10^{-3}$	147.83 **	*
F2-RISE	$7.3x10^{-4}$	147.83 **	*
M2-RISE	$3.6x10^{-2}$	744.70	*
E3-RISE	$7.9x10^{-4}$	589.84	SP, GP
E3-FALL	$4.6x10^{-4}$	589.84	SP, GP
P101B-FALL	$3.9x10^{-3}$	633.76	SM
P101C-FALL	$1.1x10^{-3}$	597.58	SP
P102B-RISE	$3.5x10^{-2}$	701.56	SP
P102B-FALL	$3.9x10^{-2}$	701.56	SP
P102C-RISE	$3.5x10^{-3}$	609.26	SP
WT101A-RISE	$2.6x10^{-2}$	745.63	SP
WT101A-FALL	$9.4x10^{-3}$	745.63	SP
WT102A-RISE	$4.1x10^{-3}$	750.89	SP,SP-GP,SM
WT102A-FALL	$6.8x10^{-3}$	750.89	SP,SP-GP,SM
WT103A-RISE	$4.1x10^{-2}$	742.12	SW-GW
WT103A-FALL	$1.8x10^{-2}$	742.12	SW-GW
WT104A-RISE	$3.8x10^{-2}$	746.88	SP,SW-GW
WT104A-FALL	$5.0x10^{-3}$	746.88	SP,SW-GW
WT105A-RISE	$1.9x10^{-2}$	744.38	SP
WT105A-FALL	$1.0x10^{-2}$	744.38	SP
WT106A-RISE	$4.7x10^{-2}$	742.97	SP, GP
WT106A-FALL	$8.4x10^{-2}$	742.97	SP, GP
WT111A-RISE	$7.7x10^{-3}$	745.02	SP, SW
WT111A-FALL	$2.5x10^{-3}$	745.02	SP, SW
AVERAGE	**$2.2x10^{-2}$**		

* Data not available
** Elevation not shot - value is actual measured well depth
\+ Unified Soil Classification System

WT-102A
P-102B
P-102C

WT-102C 1273.05 FEET NORTH OF B-2

E 405000 LINE 2 | E 405500 LINE 7 | E 406000 LINE 12 | E 406500 LINE 17 | E 407000 LINE 22

N 1533500 LINE J

N 1533000 LINE G

N 1532500 LINE L

N 1532000 LINE G

N 1531500 LINE B

N 1531000

754.94
W-0-3
W-0-2
W-0-1

756.23
W-B-1
W-B-2
W-B-3
W-B-4

755.21
W-CP-1

756

QUARRY POND

754.46
ST-01

754.91
ST-03

754.93
ST-02

755

754.46
WT-103A

SURFACE WATER PONDS

753.28
W-0-1

754

RUMFELT
RW-01
RW-02

753.54
WT-111A

KLEIN
RW-07

KOLANOWSKI
RW-05
RW-04

BOWERS
RW-08

GREESAMAN
RW-06

FREEMAN
RW-03

753.22
W-M-1
W-M-2

752.75
WT-101A
P-101B
P-101C

753

752.94
W-E-1
W-E-2
W-E-3

753.13
WT-104A

W-P-1
752.33

752.52
WT-105A

752
751.96
WT-106A

LEGEND

ST-01	STAFF GAUGE
WT-103A	DONOHUE MONITORING WELL
WT-102A P-102B P-102C	DONOHUE MONITORING WELL NEST
W-0-1	USGS MONITORING WELL
W-E-1 W-E-2 W-E-3	USGS MONITORING WELL NEST
RW-02	RESIDENTIAL WELL SAMPLE

0' 100' 200' 300'

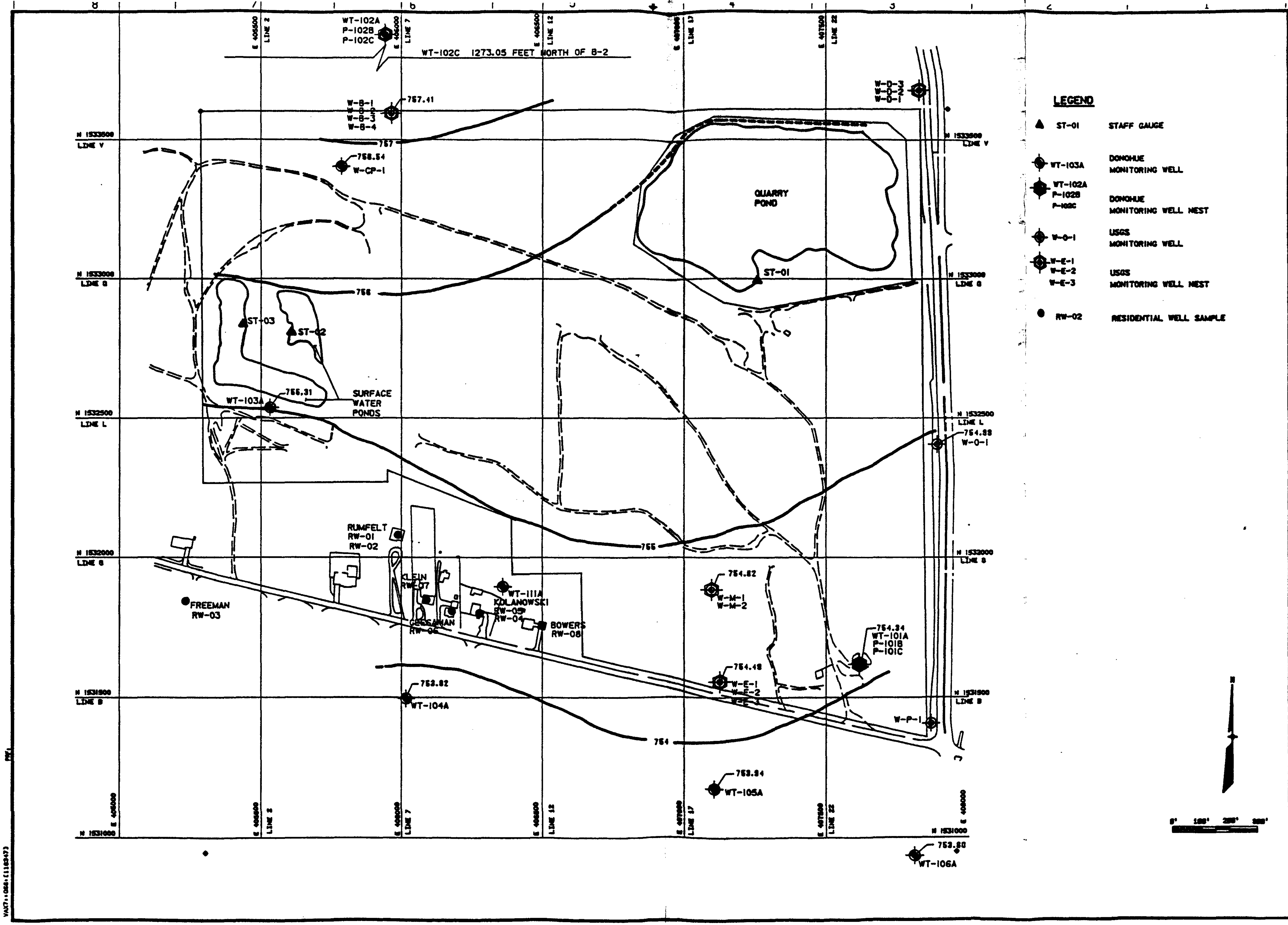
No.	Revisions	By	Date

Scale AS SHOWN
Date NOV. 1991
Designer SP
Drafter NJT
Checker
Approver

Donohue ENGINEERS ARCHITECTS SCIENTISTS

NIMCO DUMP
SUPERFUND SITE
GROUND WATER CONTOUR MAP PHASE II
FIGURE 2
ELKHART, INDIANA

Sheet No.
Chicago Off. Loc. TEM 2 File No.
Project No. 20888.024
2-4
Drawing No. 3



Scale	AS SHOWN
Date	NOV. 1991
Designer	SP
Drafter	NJT
Checker	
Approver	

No.	Revisions	By	Date

Donohue ENGINEERS ARCHITECTS SCIENTISTS

HIMCO DUMP
SUPERFUND SITE
GROUNDWATER CONTOUR MAP PHASE I
FIGURE 3
ELKHART, INDIANA

Sheet No.
Chicago Off. Loc.
TEM 2 File No.
Project No. 20026.024
2-4
Drawing No.

TABLE 2

VERTICAL FLOW GRADIENTS
HIMCO DUMP SUPERFUND SITE
Elkhart, Indiana

Compared Wells	Distance Between Well Screen Centers	Water Elevation Difference (ft) Phase I, Phase II	Vertical Gradient (ft/ft) Phase I, Phase II	
WT101A, P101B	84.65 ft	- .03, +.03	-3.5×10^{-4},	$+3.5\times10^{-4}$
P101B, P101C	67.00 ft	- .01, +.06	-1.5×10^{-4},	$+9.0\times10^{-4}$
WT101A, P101C	151.65 ft	- .04, +.19	-2.6×10^{-4},	$+1.3\times10^{-3}$
WT102A P102B	52.27 ft	+ .05, +.04	$+9.6\times10^{-4}$,	$+7.7\times10^{-4}$
P102B, P102C	94.10 ft	+ .10, +.02	$+1.0\times10^{-3}$,	$+2.1\times10^{-4}$
WT102A, P102C	146.37 ft	+ .15, +.06	$+1.0\times10^{-3}$,	$+4.1\times10^{-4}$

* Phase I data were collected in February 1991, Phase II data were collected in November 1991.

\+ Indicates upward vertical gradient.

\- Indicates downward vertical gradient.

Vertical gradients interpreted in the two well nests measured at the Himco site fluctuate from an upward vertical gradient of $1.0x10^{-3}$ ft/ft to a downward vertical gradient of $3.5x10^{-4}$ft/ft. However, vertical gradients are predominantly upward. Upward vertical gradients ranged from $2.1x10^{-4}$ ft/ft to $1.0x10^{-3}$ ft/ft. In addition, an upward vertical gradient of $7.3x10^{-4}$ ft/ft was estimated in USGS well nest B between shallow well B-2 and deep well B-1 (screened approximately 475 feet below ground surface). This indicates that upward vertical gradients persist towards the bottom of the bedrock valley.

Upward vertical gradients may be important at the Himco dump site for three reasons:

1. The chance for downward vertical migration due to convection, which carry contamination downward, are less likely to occur with consistently upward vertical gradients and

2. Because the upward vertical gradients are an order of magnitude smaller than the horizontal gradients, it can be expected that groundwater flow would be primarily lateral.

2. Flow

Phase II groundwater elevation measurements are presented in Table 3. Groundwater occurs between approximately 5 and 17 feet below the surface at an elevation ranging from 752 to 758 feet Mean Sea Level within the sand and gravel outwash deposits. The three surface water bodies at the site represent the surface expression of the water table in this area and do not constitute recharge or discharge zones for groundwater in the area. The surface water bodies include a gravel pit pond at a water elevation of 754.46 feet in the northeast corner of the site, and two excavated ponds at water elevations of 754.91 and 754.93 feet near the western edge of the site. Pond depths were approximately 25 to 30 feet in the gravel pit pond and two to nine feet in the two excavated ponds. Pond depths were estimated during surface water and sediment sampling.

Groundwater level measurements taken during Phase II were consistently lower than measurements taken during Phase I (Table 4). In this area, groundwater fluctuated as much as 1.65 feet between phase I and II measurements. Groundwater fluctuations in the Himco area are primarily due to changes in precipitation. Water table fluctuations may be important because the water table is close to the bottom of the wastes in the landfill. During relatively high water table episodes, groundwater may become in direct contact with the wastes in the landfill. This may intensity contaminant releases into groundwater.

A water table contour map for Phase II water table elevations is presented in Figure 2. Based on Figure 2, groundwater generally flows south-southeast towards the St. Joseph River, which is a regional groundwater discharge for this area. This figure shows that the groundwater flows in a more southerly direction under the western half of the site. A water table contour map for Phase I water table elevations is presented in Figure 3. The Phase I groundwater flow pattern is similar to the Phase II groundwater flow patterns.

TABLE 3

STATIC WATER LEVEL MEASUREMENTS
FEBRUARY 1 AND 2, AND NOVEMBER 19, 1991
(PHASE I, PHASE II)
HIMCO DUMP SUPERFUND SITE
Elkhart, Indiana

Well Number	Top of Pipe* Elevation (ft)	Bottom of Well (ft)	PHASE I		PHASE II	
			Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)
W-B-2	763.21	750.03	6.15	757.06	6.98	756.23
W-CP-1	760.36	740.42	3.82	756.54	4.64	755.72
W-D-1	771.11	749.21	-	-	16.17	754.94
W-E-2	764	748.22	9.82	754.49	11.37	752.94
W-M-2	769.46	744.96	14.84	754.62	16.24	753.22
W-O-1	763.34	733.82	8.34	755.00	10.08	753.26
W-P-1	761.19	737.86	-	-	8.86	752.33
WT101A	764.33	752.78	9.96	754.37	11.58	752.75
P101B	764.23	597.58	9.89	754.34	11.45	752.78
P101C	764.11	752.75	9.78	758.33	11.27	752.84
WT102A	769.07	758.98	10.17	758.91	10.92	758.15
P102B	768.81	752.75	9.85	758.96	10.62	758.19
P102C	769.22	758.15	10.27	759.06	10.27	758.21
WT103A	760.59	754.46	5.28	755.31	6.13	754.46
WT104A	765.57	753.13	11.75	757.55	12.44	753.13
WT105A	762.94	752.52	9.00	753.94	10.42	752.52
WT106A	761.47	751.96	7.87	753.60	9.51	751.96
WT111A	766.50	753.54	-	-	12.96	753.54

* Well elevation values are discussed in the attached addendum to this Technical Evaluation Memorandum
\- Mesurement not taken

A/R/HIMCO/AI8

TABLE 4

DEPTH TO WATER AND WELL BOTTOM DIFFERENCES BETWEEN PHASE I AND PHASE II STATIC WATER LEVEL MEASUREMENTS

HIMCO DUMP SUPERFUND SITE
Elkhart, Indiana

Well Number	Difference in Depth to Water (ft)	Well Depth Difference (ft)
M2	-1.4	+0.26
P101B	-1.56	*
P101C	-1.49	*
P102B	-0.77	+0.15
P102C	-0.74	*
WT101A	-1.59	+0.30
WT102A	-0.75	+0.30
WT103A	-0.85	+0.29
WT104A	-0.69	+0.29
WT105A	-1.42	+0.30
WT106A	-1.64	+0.28
AVERAGE:	**1.17**	

\+ Indicated higher measurement during Phase II
\- Indicates lower measurement during Phase II
* Measurement not taken during Phase II

3. Velocity

The groundwater flow velocity within the sand and gravel outwash underlying the Himco site was calculated by using the equation $V = Ki/n_e$, where: V = groundwater flow velocity, K = hydraulic conductivity, i = hydraulic gradient, n_e = effective porosity.

An effective porosity of 0.30 was chosen as a representative of the sand and gravel outwash beneath the Himco site. Using an average horizontal hydraulic gradient of 1.6×10^{-3} ft/ft (average between Phase I and II values), and an average hydraulic conductivity of 2.2×10^{-2} cm/s, the average velocity calculates out to be 3.9×10^{-6} ft/s (.33 ft/day), or 121 ft/yr.

CONCLUSIONS

There is evidence of groundwater contamination downgradient of the Himco site. Site-specific hydrogeologic information is important to understanding contaminant transport at the Himco site. Based on the relatively low horizontal velocity and a very low upward vertical gradient, contaminants in groundwater are expected to remain relatively close to the water table and migrate in a south-southeast direction at an approximate velocity of 121 ft/yr.

A/R/HIMCO/AH3

ATTACHMENT A

WELL INSTALLATION DIAGRAMS

Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

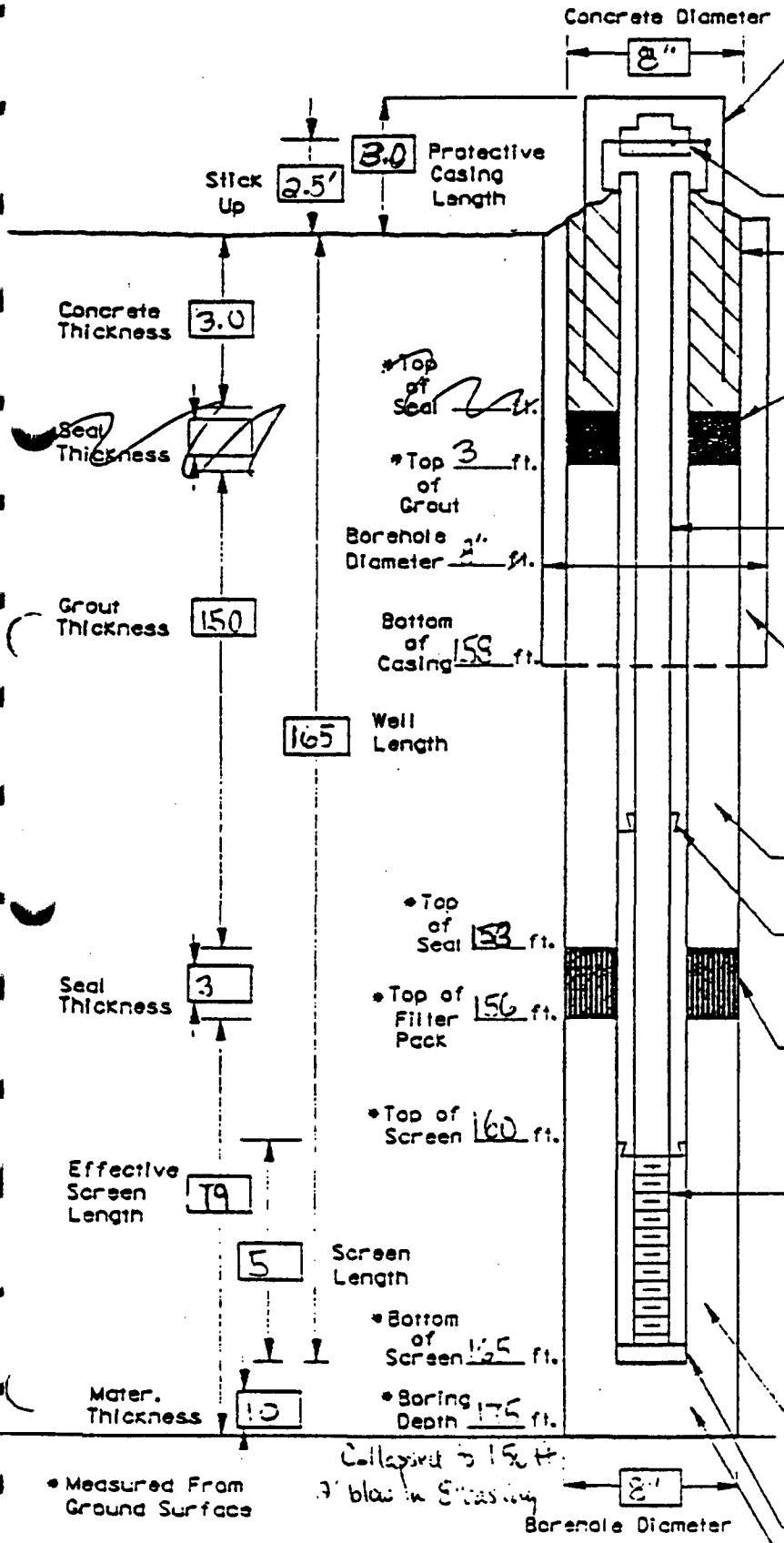
DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM

Form

Site: HMCC DUMP Date: 12/12/96

Inspected By: Tom Pinder-Ke. Project No. 300026.023 Well No. P1C1C

Driller/Contractor MAC TINNING/DIVERSIFIED/MATHES



PROTECTIVE CASING — GUARD POSTS

Type Steel Vented (Yes)/No Type Steel/Concrete

Diameter 4" Locked Yes National fitting

Length 6.0' Key # KA675

CAP OR PLUG Vented (Yes)/No Type PVC

CONCRETE COLLAR

Cement .5 lbs. + Water 2½ gal.

Total Quantity 6 cc

Manufacturer Rite Mix

UPPER SEAL

Powder/Granular/Pellets Quantity cc

Hydrated gal., Time

Manufacturer

PIPE Type Stainless Steel Schedule 5 Type 304

O.D. 2.4 I.D. 2.0

Length/Sec. 10 feet No. Of Sec. 16+1 cut

Manufacturer Dietrich Depnsk.

GROUT Type Cement/Bentonite 32% Batched

Mix 846 lbs. of TYPE I-II Portland +

45 lbs. of Bentonite powder +

Water 80 gals. Total Quant. 150 gal

Manufacturers Portland-Lafarge Bentonite Wyo

OUTSIDE GROUT Type

AMOUNT

JOINTS Flush Threaded (Yes)/No

Teflon Taped (Yes)/No O-Ring Yes (No)

Manufacturer Dietrich

LOWER SEAL

~~Powder/Pellets Quantity~~ 10 lbs cc

Hydrated Slurry 10 gal., Size

Manufacturer NATURAL GEL WYO-BEN PRODUCT

SCREEN

Type Continuous Wire Stainless Schedule 5

Length/Sec. 5 ft No. of Sec. 1

O.D. 2.4" I.D. 2.0"

Slot Size .010 ~~No. Slots/ft.~~

Manufacturer Dietrich

FILTER PACK Type(s) Natural Formation

~~Source~~ Fine Silica Sand ~~Volume~~ cc

~~Manufacturer~~

PLUG OR CAP Type Stainless Length 1"

MATERIAL Natural Formation - SM

* Measured From Ground Surface

WATER SOURCE Fire Hydrant in front of Fitness Center

Form 10-

Donohue

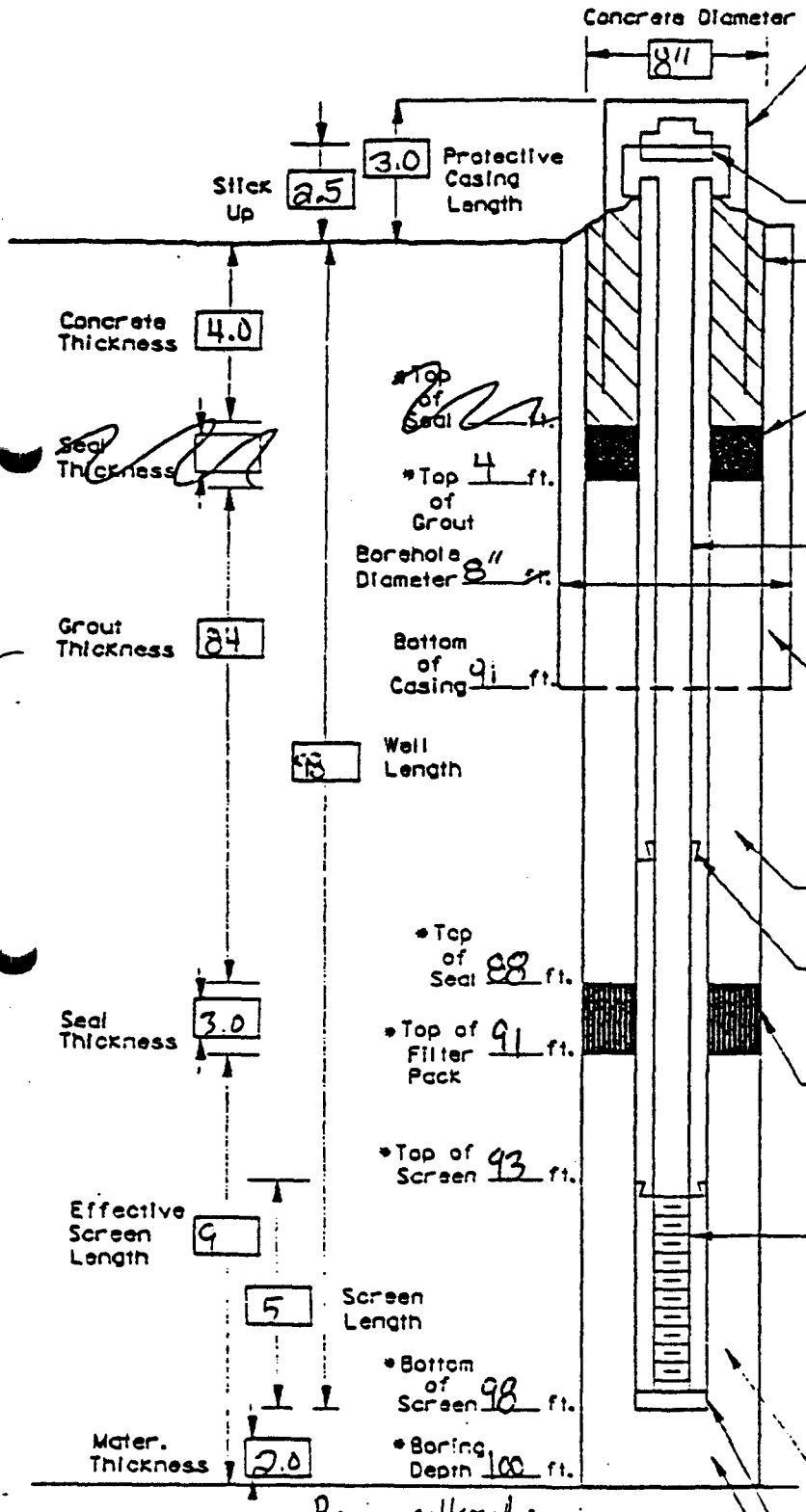
DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM

Site: Hi Mic Dump Date: 12/14/90

Inspected By: Tom Puchalski Project No. 2026.023 Well No. P101B

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

Driller/Contractor Max Tinnin Dan Brewington / Mathes



PROTECTIVE CASING GUARD POSTS

Type Steel Vented (Yes)/No Type Steel/Cement

Diameter 4" Locked Yes National fitting

Length 6.0' Key # KA675

CAP OR PLUG Vented (Yes)/No Type PVC

CONCRETE COLLAR

Cement 165 lbs. + Water 12.5 gal.

Total Quantity 12 gal.

Manufacturer Rite Mix

UPPER SEAL

Powder/Granular/Pellets Quantity ~~gal.~~

Hydrated ~~gal.~~ time

Manufacturer

PIPE Type Stainless Steel Schedule 5 Type 304

O.D. 2.4" I.D. 2.0"

Length/Sec. 10 feet No. Of Sec. 10

Manufacturer Dietrich

GROUT Type Cement/Bentonite (Mixed 12/14)

Mix 846 lbs. of Type I A Portland +

45 lbs. of bentonite powder +

Water 80 gals. Total Quant. 150 gal.

Manufacturers Portland-Lafarge Bentonite with E

OUTSIDE GROUT Type

AMOUNT

JOINTS Flush Threaded (Yes)/No

Teflon Taped (Yes)/No O-Ring Yes (No)

Manufacturer Dietrich

LOWER SEAL

(Powder)/Pellets Quantity 10 lbs ~~gal.~~

~~Hydrated~~ Slurry 15 gal. ~~Time~~

Manufacturer Natural Gel WYOBEN PRODUCTS

SCREEN

Type Schedule

Length/Sec. 5 ft No. of Sec. 1

O.D. 2.4" I.D. 2.0"

Slot Size .010 ~~No. Slots/ft.~~

Manufacturer Dietrich

FILTER PACK Type(s) Natural Formation Sand

~~Source~~ Fine silty Sand ~~Volume~~

~~Manufacturer~~

PLUG OR CAP Type Stainless Length 1"

MATERIAL Natural Formation Fine grained Silty Sand

WATER SOURCE Fire hydrant in front of Elkhart Water Works

Notes:

* Measured From Ground Surface

Boring collapsed on screen and out of 8" casing as it was pulled

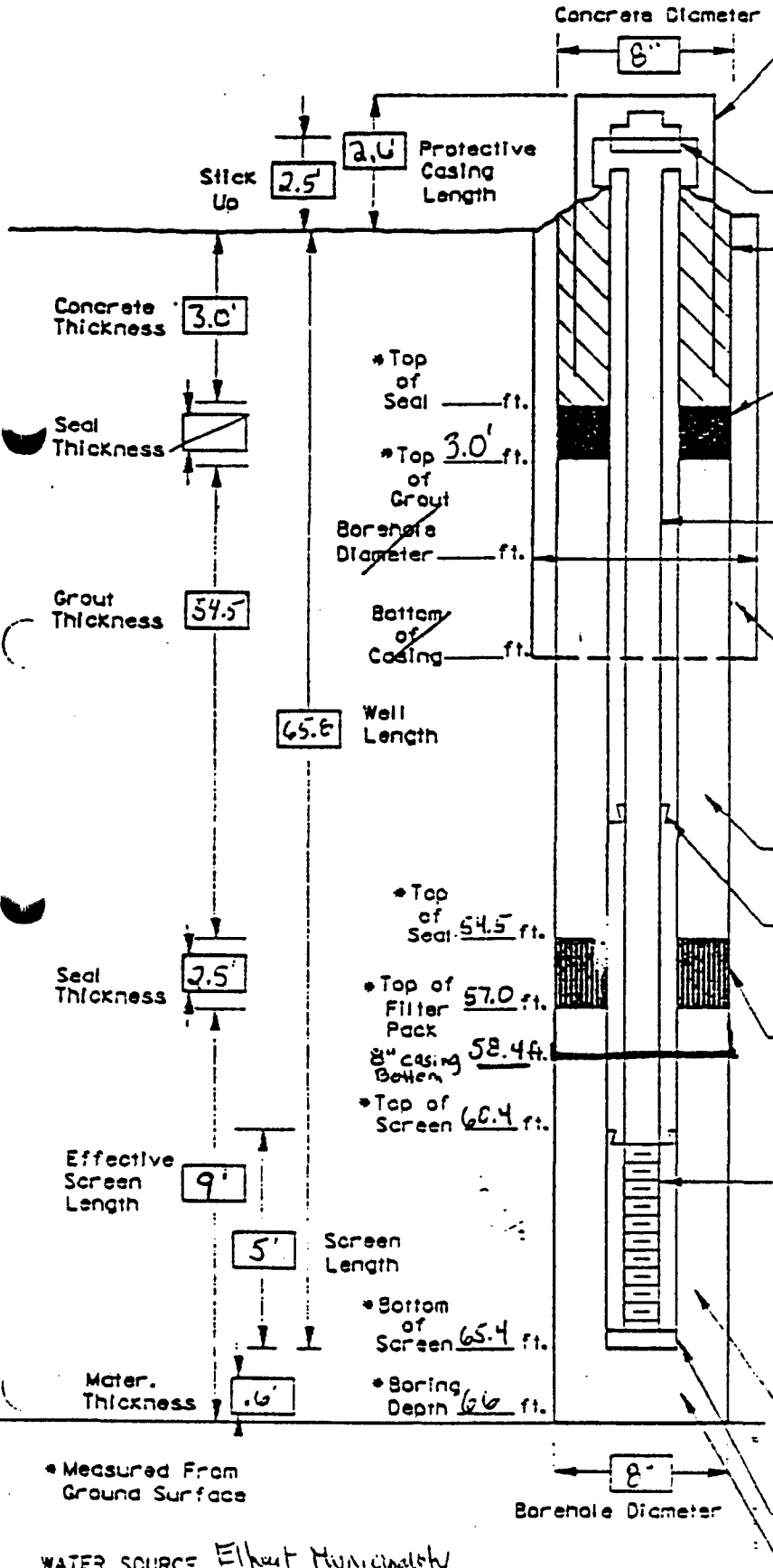
Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM

Form

Site: Himco Dump Date: 12/2/90
Inspected By: S. Padovani Project No. 20076 Well No. P102B
Driller/Contractor Max Tinnin / Mathes



PROTECTIVE CASING — GUARD POSTS
Type Steel Vented (Yes) No Type Iowa C. Hex
Diameter 4" Locked Yes
Length 4' Key # 192-641

CAP OR PLUG Vented Yes/(No) Type PVC

CONCRETE COLLAR
Cement 50 lbs. + Water 5 gal.
Total Quantity ____ cc
Manufacturer ____

UPPER SEAL
Powder/Granular/Pellets Quantity ____ cc
Hydrated ____ gal.. Time ____
Manufacturer ____

PIPE Type Stainless Steel Schedule 5
O.D. 2 3/8" I.D. 2"
Length/Sec. 10' No. Of Sec. 6
Manufacturer Diedrich

GROUT Type ____
Mix ____ lbs. of ____ +
____ lbs. of ____ +
Water ____ gals. Total Quant. ____ cc
Manufacturers ____

OUTSIDE GROUT Type Bentonite-Portland Mix
AMOUNT 9 gal H.O. 9 bags portland (94lb/bag) 45 lbs ben

JOINTS Flush Threaded (Yes)/No
Teflon Taped (Yes)/No O-Ring Yes/No
Manufacturer ____

LOWER SEAL
Powder/(Pellets) Quantity 5 cc
Hydrated by formation water gal.. Time 1100
Manufacturer Laferge

SCREEN
Type Stainless Steel Schedule 5
Length/Sec. 6.8' No. of Sec. 1
O.D. 2 1/4" I.D. 2"
Slot Size 10 No. Slots/ft. 150
Manufacturer Diedrich

FILTER PACK Type(s) Natural grain size 2mm - 3mm
Source Ozark Materials Volume ____ cc
Manufacturer General Materials

PLUG OR CAP Type Stainless Steel Length 1.5'

MATERIAL Sand + Gravel

WATER SOURCE Elburt Municipality

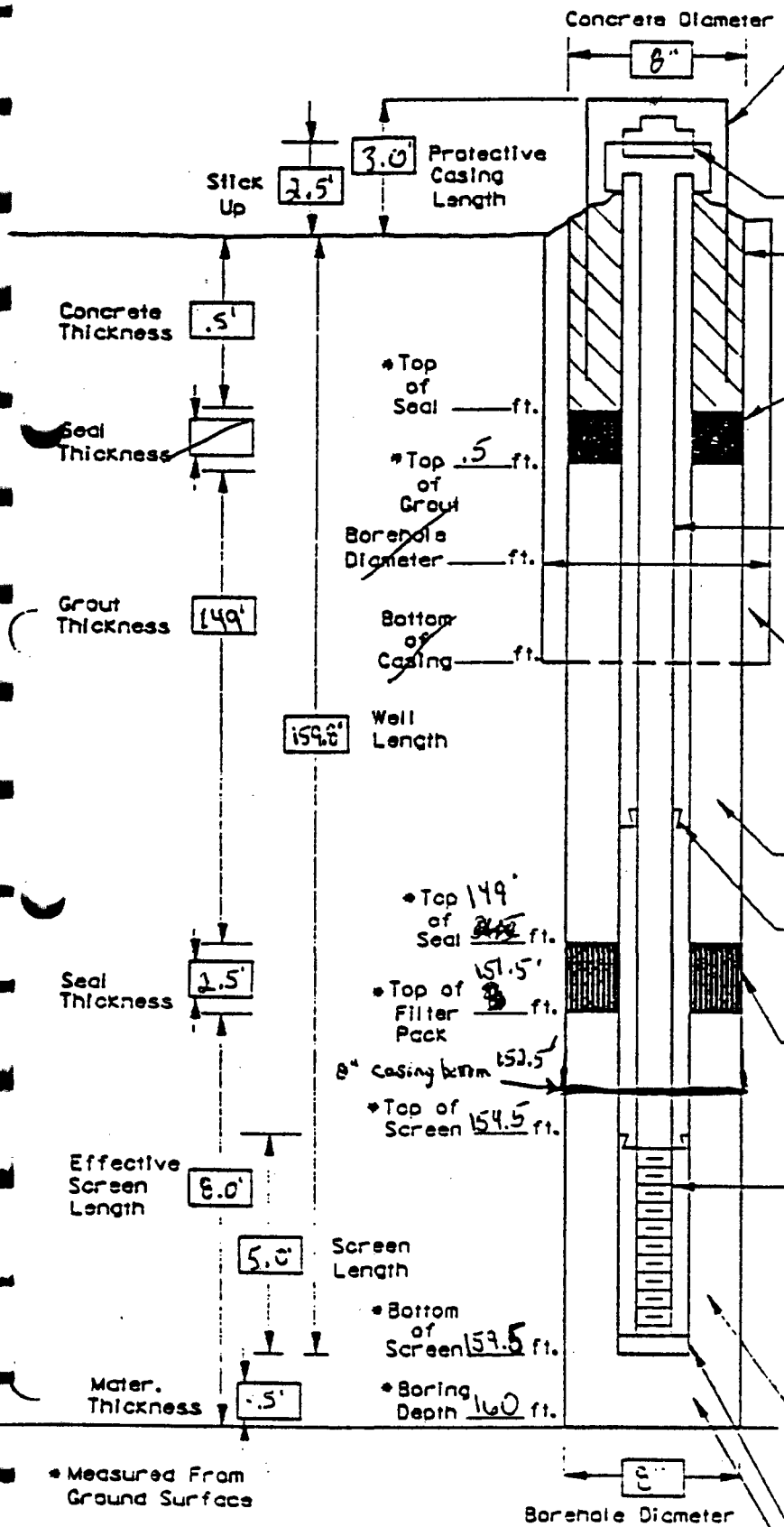
Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

DOUBLE CASING WELL/PIEZOMETER INSTALLATION DIAGRAM

Form

Site: Hmca Dump Date: 12/1/90
Inspected By: S. Paderani Project No. 20026 Well No. P102C
Driller/Contractor MacTinnon / Mathes



PROTECTIVE CASING
Type Steel Vented Yes/(No)
Diameter 4" Locked Yes
Length 4' Key # 192-641

GUARD POSTS
Type Lasie Fitch

CAP OR PLUG Vented Yes/(No) Type

CONCRETE COLLAR
Cement .50 lbs. + Water .5 gal.
Total Quantity cc
Manufacturer

UPPER SEAL
Powder/Granular/Pellets Quantity cc
Hydrated gal.. Time
Manufacturer

PIPE Type Stainless Steel Schedule 5
O.D. 3 1/2" I.D. 3"
Length/Sec. 10ft/sec. No. Of Sec. 16 + 1/4 sb.
Manufacturer Diedrich

GROUT Type
Mix lbs. of + lbs. of
Water gals. Total Quant. gal.
Manufacturers

OUTSIDE GROUT Type Cement-bentonite grout - Volclay
AMOUNT 425 gal

JOINTS Flush Threaded (Yes)/No
Teflon Taped (Yes)/No O-Ring Yes/No
Manufacturer

LOWER SEAL
(Powder)/Pellets Quantity ~10 qc.
Hydrated gal.. Time
Manufacturer Latinge

SCREEN
Type ~~Black~~ steel Schedule 5
Length/Sec. [illegible] No. of Sec. 1
O.D. 2 1/4" I.D. 2"
Slot Size 10 No. Slots/ft. 180
Manufacturer Diedrich

FILTER PACK Type(s) Natural Material 160 - 154.5 sw 240
Source Clark Mountains Volume cc
Manufacturer General material

PLUG OR CAP Type Steel Length 1.5"

MATERIAL Fine Sand

WATER SOURCE Elkart - Main St Station water treatment plant

Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

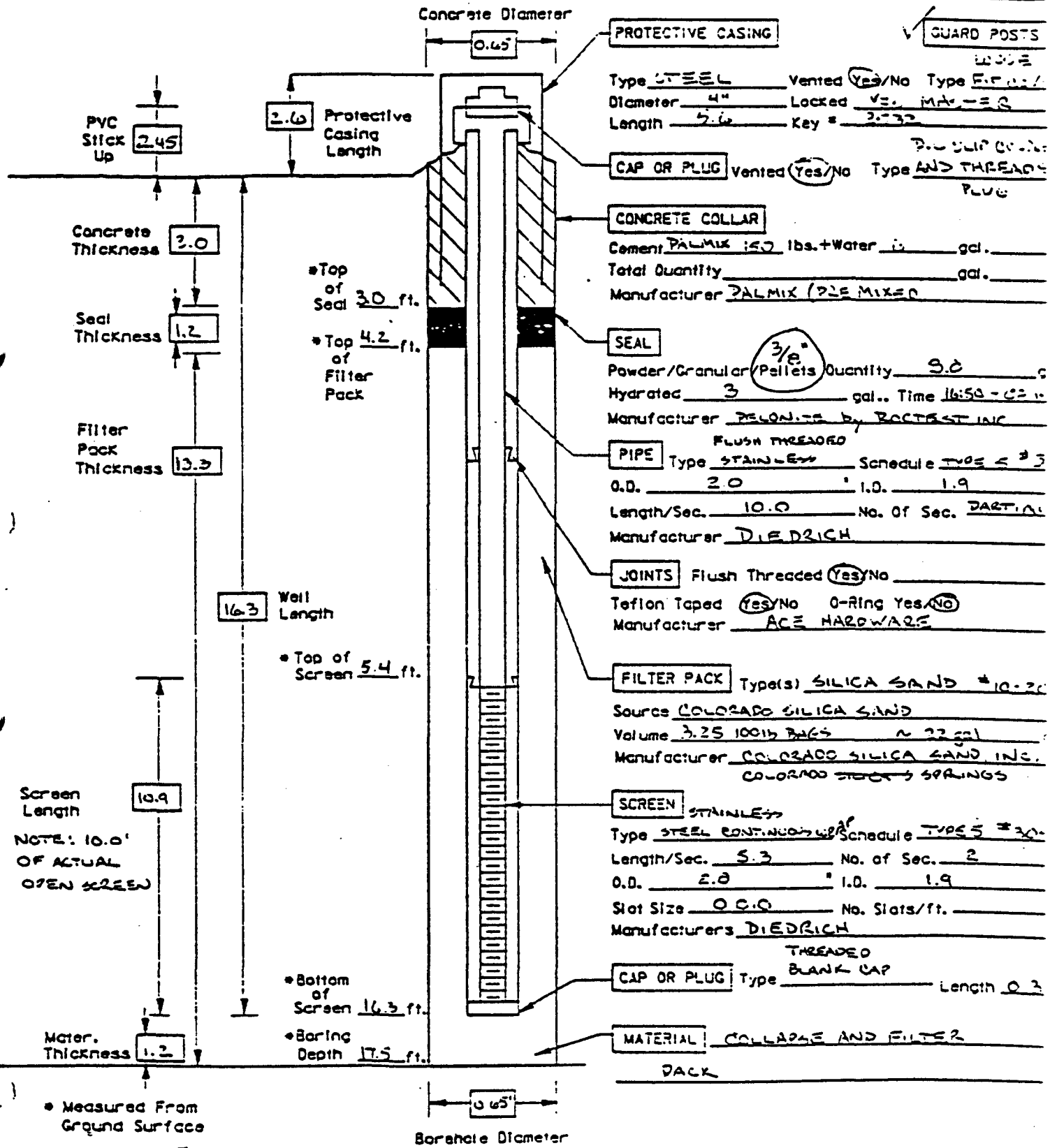
Water Table Well Installation Diagram

Form

Site: LIMED DUMP Date: NOVEMBER 12, 1990

Inspected By: _____ Project No. 20026.263 Well No. WT-101A

Driller/Contractor _____



PROTECTIVE CASING ✓ GUARD POSTS

Type STEEL Vented (Yes)/No Type FLUSH

Diameter 4" Locked YES, MASTER

Length 5.6 Key # 2732

CAP OR PLUG Vented (Yes)/No Type SLIP ON THREADED PLUG

CONCRETE COLLAR

Cement PALMIX 150 lbs. + Water 15 gal.

Total Quantity _____ gal.

Manufacturer PALMIX (DE MIXED)

SEAL

Powder/Granular/(3/8" Pellets) Quantity 9.0 #

Hydrated 3 gal. Time 16:50 - 17:10

Manufacturer PELONITE by BAROID INC

PIPE FLUSH THREADED Type STAINLESS Schedule TYPE 5 #304

O.D. 2.0 " I.D. 1.9

Length/Sec. 10.0 No. Of Sec. PARTIAL

Manufacturer DIEDRICH

JOINTS Flush Threaded (Yes)/No

Teflon Taped (Yes)/No O-Ring Yes/(No)

Manufacturer ACE HARDWARE

FILTER PACK Type(s) SILICA SAND #10-20

Source COLORADO SILICA SAND

Volume 3.25 100lb BAGS ~ 22 gal

Manufacturer COLORADO SILICA SAND INC. COLORADO SPRINGS

SCREEN STAINLESS

Type STEEL CONTINUOUS SLOT Schedule TYPE 5 #304

Length/Sec. 5.3 No. of Sec. 2

O.D. 2.0 " I.D. 1.9

Slot Size 0.010 No. Slots/ft. _____

Manufacturers DIEDRICH

CAP OR PLUG THREADED Type BLANK CAP Length 0.3

MATERIAL COLLAPSE AND FILTER PACK

WATER SOURCE ELKHART MUNICIPAL WATER SUPPLY

Notes: _____

Donohue

Water Table Well Installation Diagram

Form

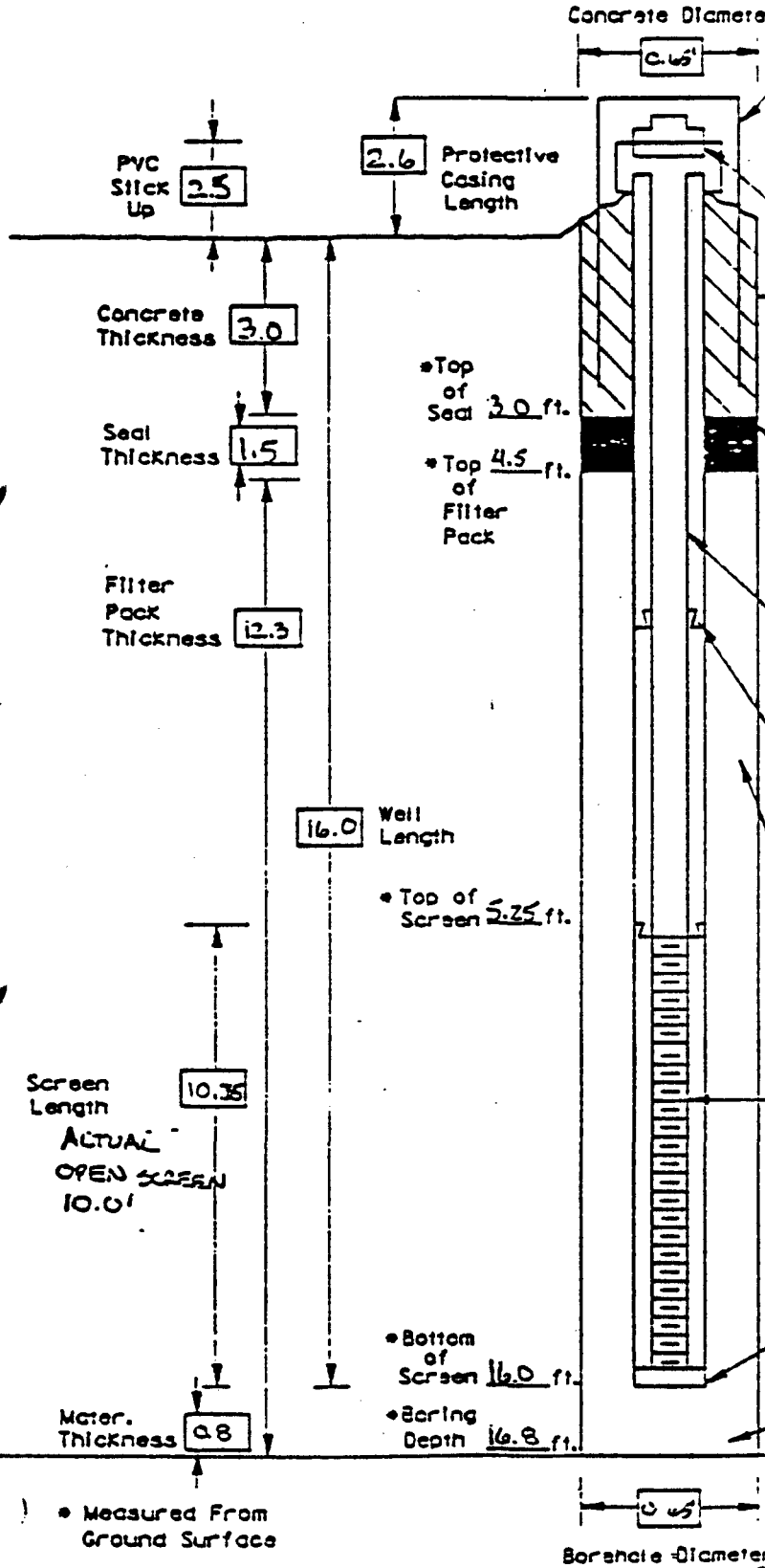
Site: HIMCO DUMP SITE Date: 11-

Inspected By: R. CANNESTRA Project No. 20026 Well No. WT-102A

Engineers & Architects — Computer Aided Design/Drafting

R Cannestra

Driller/Contractor D. ELLIS / MATHES



PROTECTIVE CASING — **GUARD POSTS**

Type STEEL Vented (Yes)/No Type LOCKE CAP

Diameter 4" Locked YES, MASTER

Length 5.6' Key # 2532

CAP OR PLUG Vented (Yes)/No Type PVC SLIP END W/ THREADED PLUG

CONCRETE COLLAR

Cement PRE-MIX lbs.+Water ____ gal. ____

Total Quantity 2 BAGS + 7 gal gal. ____

Manufacturer GENERAL CONTRACTORS ST. LOUIS MISSOURI

SEAL

Powder/Granular (Pellets) 3/8" Quantity 4 ____

Hydrated H2O # 3 gal.. Time 17:05 - 17:3[illegible]

Manufacturer PEL-O-NITE, ROCKTEST, INC

PIPE Type STAINLESS STEEL Schedule TYPE 5 GRADE 304

O.D. 2.0 " I.D. 1.9

Length/Sec. 10.1 No. Of Sec. PARTIAL

Manufacturer DIEDRICH

JOINTS Flush Threaded (Yes)/No ____

Teflon Taped (Yes)/No O-Ring Yes/(No)

Manufacturer ACE HARDWARE

FILTER PACK Type(s) SILICA SAND #10-20

Source COLORADO SILICA SAND CO.

Volume 2 YD 100 lb BAGS + 22.0 ____

Manufacturer COLO SILICA SAND CO, COLORADO SPRINGS, COLO.

SCREEN CONTINUOUS WIRE-WRAP TYPE 5

Type STAINLESS STEEL Schedule GRADE 304

Length/Sec. 5.3 No. of Sec. 2

O.D. ____ " I.D. ____

Slot Size 0.010 No. Slots/ft. CONTINUOUS WIRE WRAP

Manufacturers DIEDRICH

CAP OR PLUG Type STAINLESS STEEL Length 0.1'

MATERIAL COLLAPSE & FILTER SAND

WATER SOURCE ELKHART MUNICIPAL WATER PLANT

Notes: BORING EXTENDED TO 16.8 RATHER THAN 16.0 TO ALLOW FOR "SLUFF" WHEN PULLING AUGERS

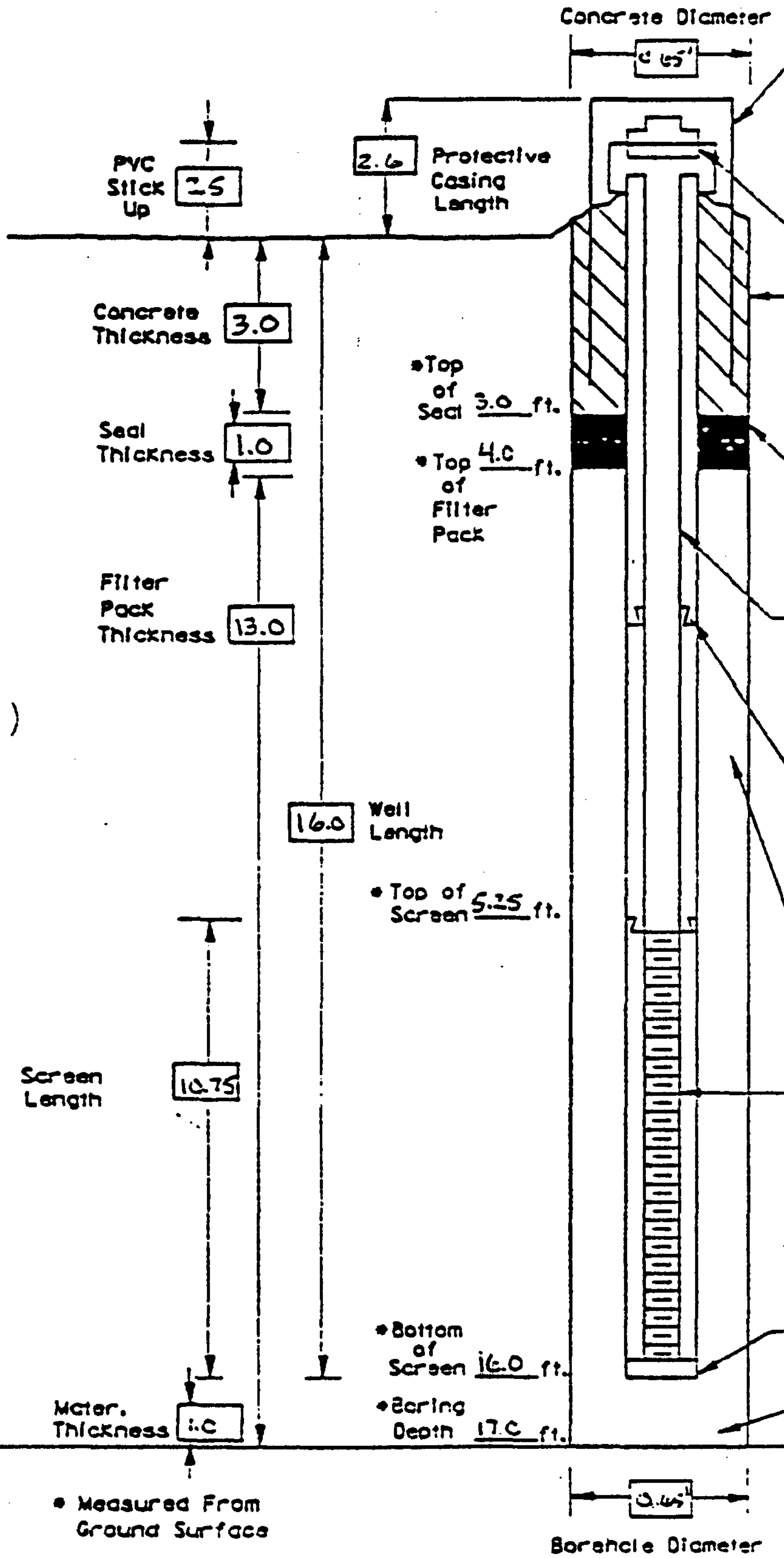
Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

Water Table Well Installation Diagram

Form

Site: HIMCO DUMP Date: 11/1/90
Inspected By: R. CANNESTRA Project No. [illegible] Well No. WT-103A
Driller/Contractor: D. ELLIS / MATHES



PROTECTIVE CASING **GUARD POSTS**

Type STEEL Vented (Yes)/No Type NONE [illegible]
Diameter 4" Locked YES MASTER
Length 5.0 Key # 2532

CAP OR PLUG Vented (Yes)/No Type SLIP COUPLE & WITH REAR [illegible] PLUG

CONCRETE COLLAR

Cement PREE-MIX lbs.+Water ______ gal. ______
Total Quantity ______ gal. ______
Manufacturer GENERAL CONTRACTORS ST LOUIS, MO

SEAL

Powder/Granular (Pellets) 3/8 Quantity 3 GAL
Hydrated 2.5 gal., Time 12:0? - 14:?
Manufacturer PELONITE by ROCKTEST

PIPE

Type FLUSH THREADED STAINLESS Schedule TYPE 5 GRADE 30?
O.D. 2.0" I.D. 1.5"
Length/Sec. 10.0' No. Of Sec. PARTIAL
Manufacturer DIEDRICH

JOINTS Flush Threaded Yes/No ______

Teflon Taped Yes/No O-Ring Yes/No
Manufacturer ______

FILTER PACK Type(s) SILICA SAND

Source COLORADO SILICA SAND
Volume 2.5 100 LB BAGS X 19.5
Manufacturer COLORADO SILICA SAND COLORADO SPRINGS COLO.

SCREEN CONTINUOUS WIRE

Type WRAP STAINLESS Schedule TYPE 5 GRADE 304
Length/Sec. 5.3 No. of Sec. 2
O.D. 2.0" I.D. 1.9"
Slot Size 0.010 No. Slots/ft. ______
Manufacturers DEIDRICH

CAP OR PLUG Type STAINLESS THREADED PLUG Length 0.15

MATERIAL COLLAPSE & FILTER PACK

* Measured From Ground Surface

WATER SOURCE ELKHART MUNICIPAL WATER PLANT

Notes: ______

Donohue

Engineers & Architects
COMPUTER AIDED DESIGN/DRAFTING

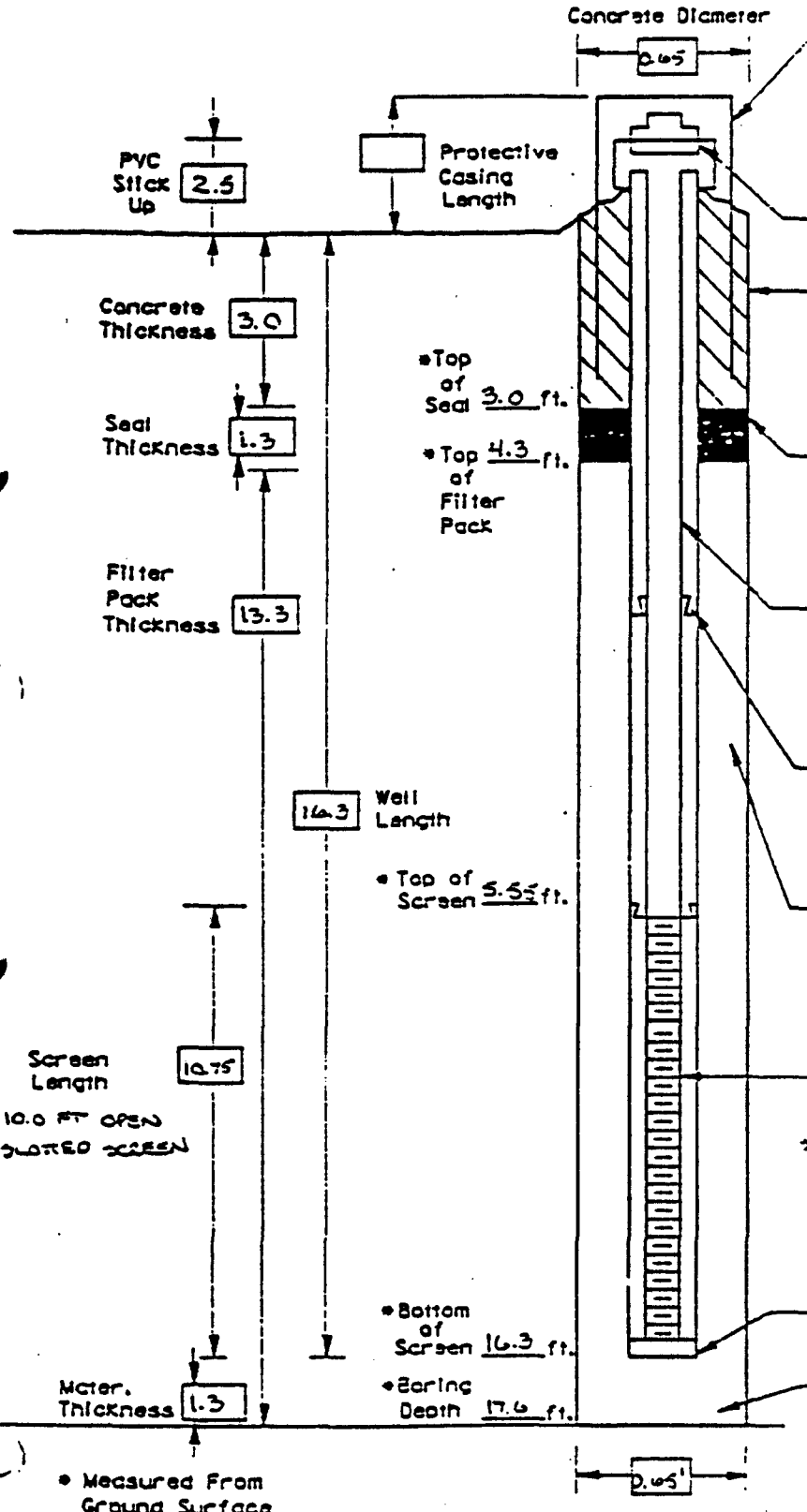
Water Table Well Installation Diagram

Form

Site: HIMCO DUMP SITE Date: 11/12/90

Inspected By: R. CANNESTRA Project No. 2003.002 Well No. WT-104A

Driller/Contractor D. ELLIS / MATHES



PROTECTIVE CASING — GUARD POSTS

Type STEEL Vented (Yes)/No Type LOOSE FITTING W/ MASTER

Diameter 4" Locked YES, MASTER

Length 5.0' Key # 1537

CAP OR PLUG Vented (Yes)/No Type SLIP CAP (PVC W/ THREADED PLUG

CONCRETE COLLAR

Cement FALMIX lbs.+Water ____ gal. ____

Total Quantity ____ gal. ____

Manufacturer FALMIX

SEAL

Powder/Granular X Pellets (3/8") Quantity 3.0 ____

Hydrated 2.0 gal., Time 9:50 - 11:15

Manufacturer DEL-ONITE L. ROCKET

PIPE Type FLUSH THREAD STAINLESS Schedule TYPE 5 FT.

O.D. 2.0 " I.D. 1.9

Length/Sec. 10.0 No. Of Sec. PARTIAL

Manufacturer DIEDRICH

JOINTS Flush Threaded (Yes)/No ____

Teflon Taped (Yes)/No O-Ring Yes/(No)

Manufacturer ACE HARDWARE

FILTER PACK Type(s) GRADE 10/20 SILICA SAND

Source COLORADO SILICA SAND

Volume 35 100 LB BAGS 24.0

Manufacturer COLORADO SILICA SAND, INC. P.O. BOX 15615 COLORADO SPRINGS, CO

SCREEN

Type CONTINUOUS WIRE WEAR-STAINLESS Schedule TYPE 5/304

*Length/Sec. 5.3 No. of Sec. 2

O.D. 2.0 " I.D. 1.9

Slot Size 0.010 No. Slots/ft. ____

Manufacturers DIEDRICH

CAP OR PLUG Type STAINLESS THREADED PLUG Length 0.1'

MATERIAL COLLAPSE & FILTER PACK

WATER SOURCE ELKHART MUNICIPAL WATER PLANT

Notes: WATER LEVEL 9.9 FT FROM GS THROUGH AUGERS

TEN FT OPEN SCREEN @ COMPLETION 11.5 FT 3-7-90 10:5

Donohue

Water Table Well Installation Diagram

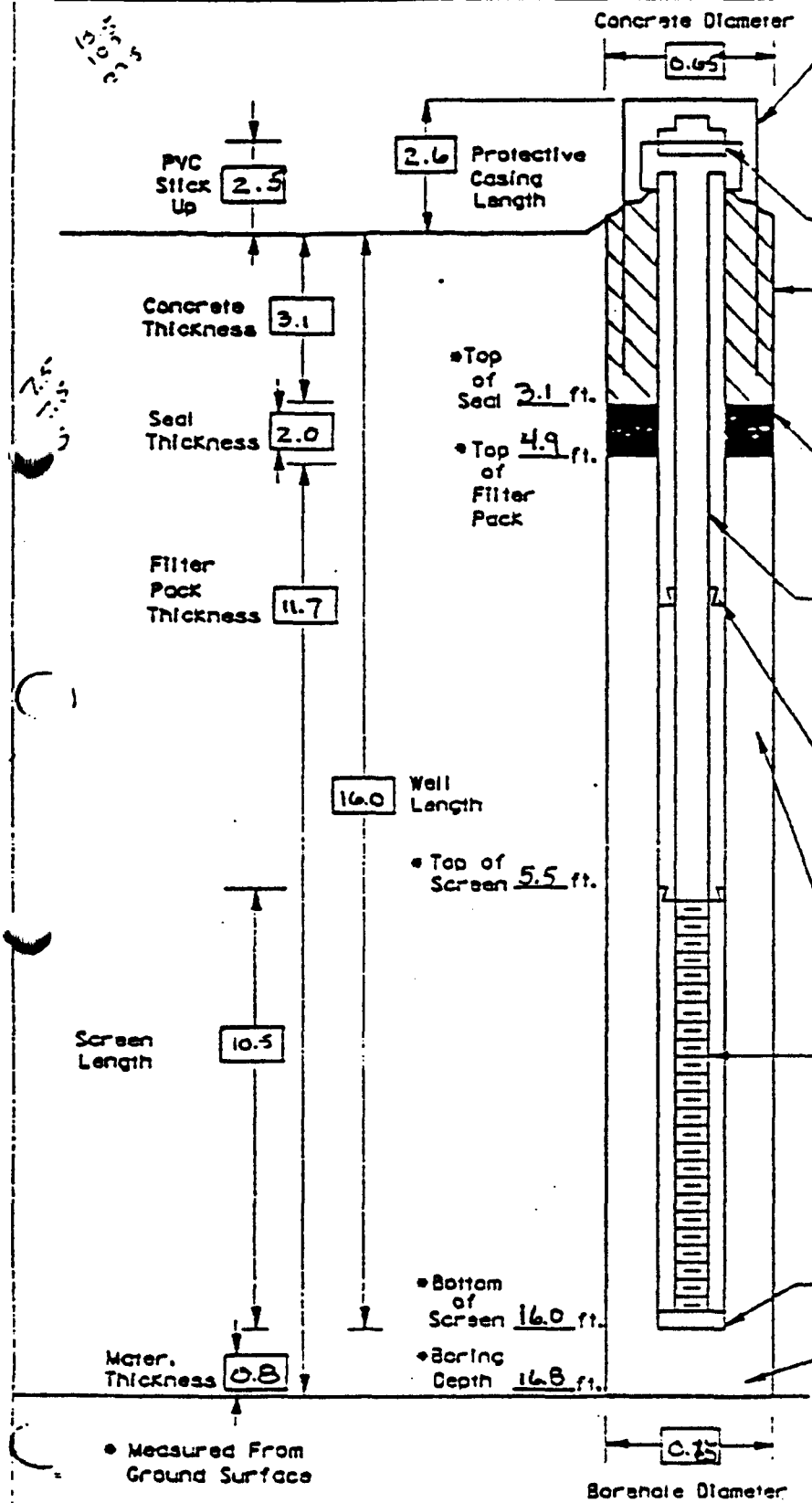
Form

Site: HIMCO DUMP Date: 11/10/90

Inspected By: R. CANNESTRA Project No. 20026 Well No. WT-103A

Engineers & Architects — COMPUTER AIDED DESIGN/DRAFTING

Driller/Contractor D ELLIS/MATHES



* Measured From Ground Surface

PROTECTIVE CASING — GUARD POSTS: LOCAL

Type STEEL Vented (Yes)/No Type LOCAL

Diameter 4" Locked MASTER

Length 5.6' Key # 2532

CAP OR PLUG Vented (Yes)/No Type PVC THREAD SLIP CAP & PLUG

CONCRETE COLLAR

Cement PREMIXED lbs.+Water VARIABLE gal.

Total Quantity 3 BAGS gal. ± 15

Manufacturer GENERAL MATERIALS, ST LOUIS

SEAL

Powder/Granular/(Pellets) Quantity 5 gal cc

Hydrated 2.5 gal.. Time 9:15 - 9:42

Manufacturer PELONITE by Rockwood INC

PIPE Type STAINLESS Schedule

O.D. I.D.

Length/Sec. 10.1 No. Of Sec. PART OF

Manufacturer DIEDRICH

JOINTS Flush Threaded (Yes)/No

Teflon Taped (Yes)/No O-Ring Yes/(No)

Manufacturer ACE HARDWARE

FILTER PACK Type(s) SILICA SAND #10-20

Source COLORADO SILICA SAND, COLORADO SPG

Volume 20 gal 2 and 5/8 bags

Manufacturer COLORADO SILICA SAND

SCREEN CONTINUOUS WRAP

Type STAINLESS Schedule

Length/Sec. 5. No. of Sec. 2

O.D. I.D.

Slot Size 0.01 No. Slots/ft.

Manufacturers DIEDRICH

CAP OR PLUG Type STAINLESS Length 0.1

MATERIAL COLORADO & SILICA SAND

WATER SOURCE

Notes: WATER @ 7.5' THRU AUGERS

SEAL HYDRATED 25-30 MIN BEFORE PLACING CONCRETE CAP

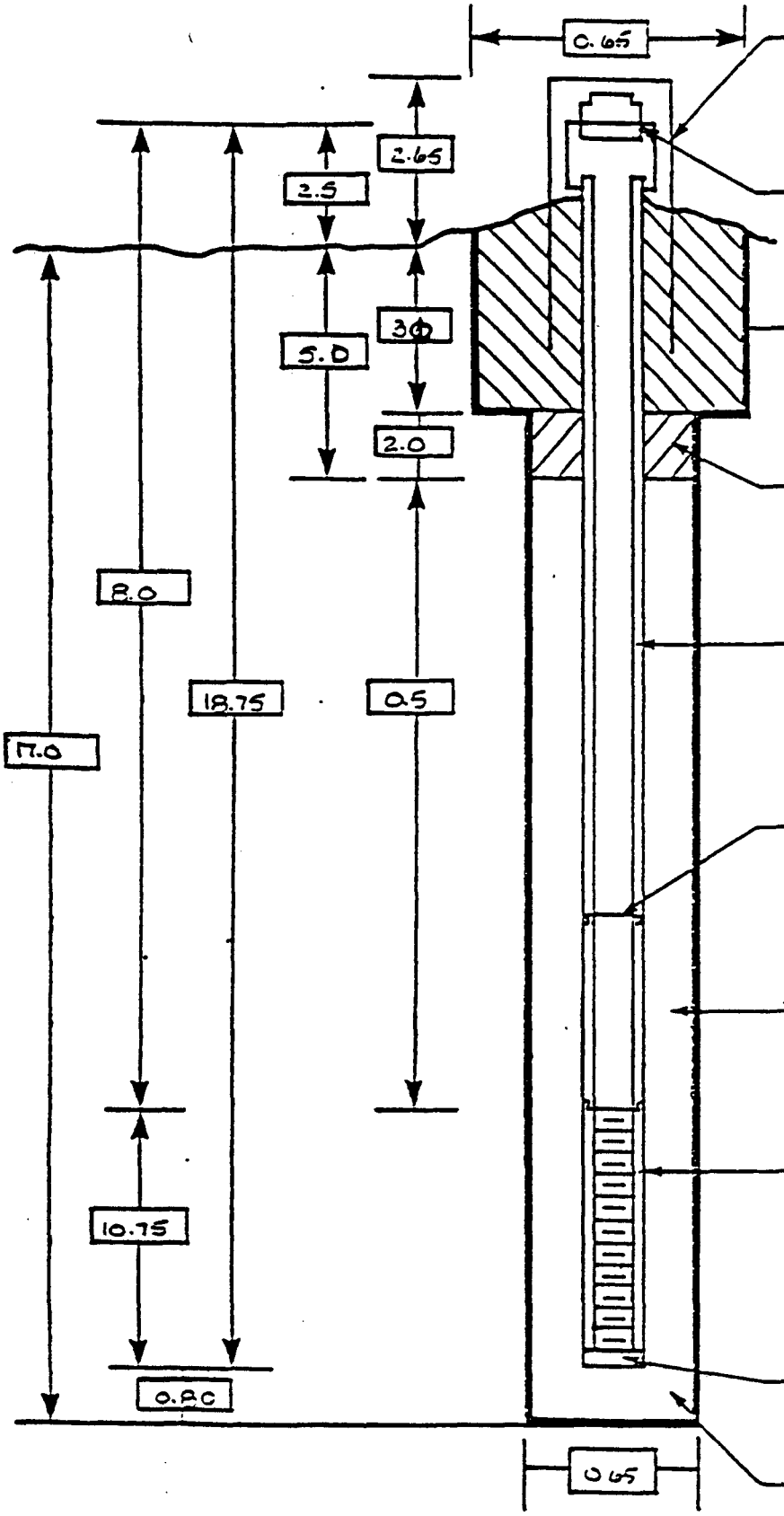
Donohue

OBSERVATION WELL INSTALLATION DIAGRAM

Well No. WT 106A

Site: HIMCO DUMP, ELKHART, IN Date: NOVEMBER 9 1990

By: R. CANNESTRA / MATHES Project No. 20026.03



Protective Casing — **Guard Posts**

Type STEEL Vented ✓ Type STEEL 3

Diameter 4" Locked YES MASTER

Length 5.6 Key # 2532

Plug

Type SLIP COUPLING W/ THREADED PLUG

Vented YES

Concrete Collar PREMIXED

MIXTURE

Grout Cement 150 lbs. + Quant. Water ___ gal.

Total Quant. 5.0 gal.

Manufacturer READY MIX, GENERAL CONC. ST LOUIS MO

Seal

Powder/Granular/Pellets (3/8) Quant. 5.0 gal.

Manufacturer DELIDITE by BAROID

Hydrated 2.5 gal., Time 11:01 – 11:30

Pipe

Type FLUSH THREADED STAINLESS STEEL

O.D. 2.0 " Manufacturer DIEDRICH

I.D. 1.9 " Schedule TYPE S #304

Length/per sec. 10.0 No. of sec. PARTIAL

Joints

Threaded Flush Joint YES

Teflon Taped (Yes)/No

Tape TEFLON

Manufacturer ACE HARDWARE

Backfill

Type(s) SILICA SAND #10-20

Source IN. CEDAR SILICA SAND, CO. IN.

Volume

Screen

CONTINUOUS

Type WIRE WRAP Slot Size 0.010

O.D. 2.0 " No. Slots/ft.

I.D. 1.9 " Schedule TYPE S #304

Manufacturer DIEDRICH

Length/per sec. 5.3 No. of sec. 2

Cap

Type THREADED STAINLESS STEEL PLUG (0.1' LENGTH

Material

COLLAPSE & FILTER PACK

Notes: Water Source ELKHART MUNICIPAL WATER WORKS

WATER LEVEL IN BOREHOLE PRIOR TO INSTALLATION ~7.0 BELOW GS

Form 1

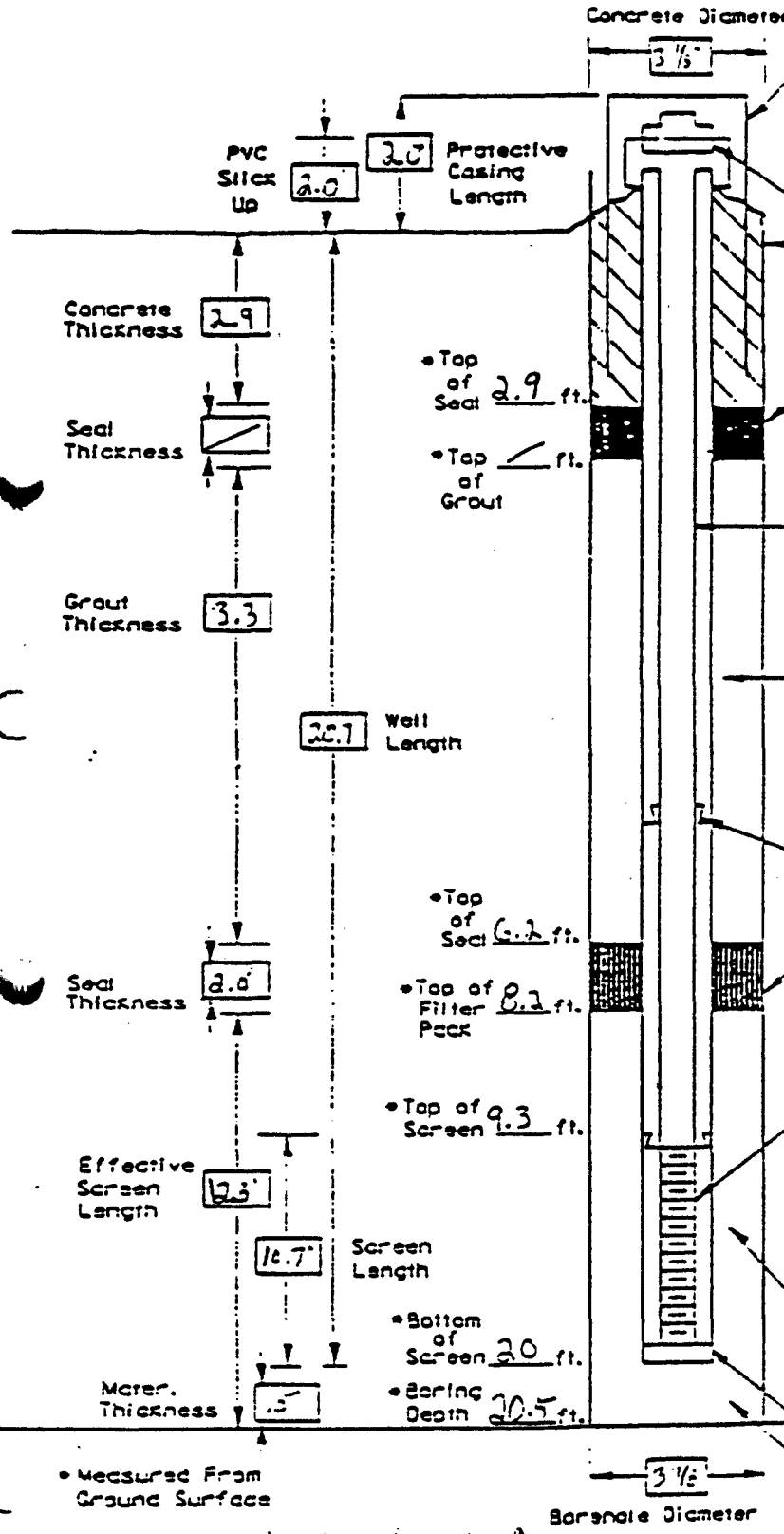
Water Table Well Installation Diagram

Donohue Engineers & Architects

Site: Hinco Date: 9/6/01

Inspected By: _____ Project No. 3083 Well No. WT111-1

Driller/Contractor Mathes



PROTECTIVE CASING — **GUARD POSTS**

Type Steel Vented (Yes/No) Type Steel-4"

Diameter 4" Locked Yes

Length 4' Key # 2532

CAP/OR PLUG Vented (Yes/No) Type PVC

CONCRETE COLLAR

Cement 30 lbs. + Water 5 gal.

Total Quantity 5 cc

Manufacturer

UPPER SEAL

Powder/Granular/Pellets Quantity cc

Hydrated gal.. Time

Manufacturer

PIPE Type Stainless Steel Schedule 40

O.D. 2 1/8" I.D. 2"

Length/Sec. 10' No. Of Sec. 1 - 2.0 sec + 1 - 5'

Manufacturer

GROUT Type Bentonite cement

Mix 12 lbs. of bentonite +

lbs. of +

Water 20 gals. Total Quant. 15 gal.

Manufacturers

JOINTS Flush Threaded (Yes/No)

Teflon Taped (Yes/No) O-Ring Yes (No)

Manufacturer

LOWER SEAL

Powder/(Pellets) Quantity 5 cc.

Hydrated ≈5 gal..Time 1430

Manufacturer

SCREEN

Type Stainless steel Schedule 40

Length/Sec. 5' No. of Sec. 2

O.D. 2 1/8" I.D. 2"

Slot Size .010-inch No. Slots/ft.

Manufacturer

FILTER PACK Type(s) No. 50 sand

Source Colorado Volume 3.5 cc

Manufacturer CCC

PLUG OR CAP Type stainless Length .5'

MATERIAL #0 Borehole sand

WATER SOURCE Main Street Hydrant #

Notes: Protective casing used here above ground surface